

The American Statistician

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The President's Column



Rensis Likert

THE BEGINNING OF TECHNOMETRICS

About the time this issue of THE AMERICAN STATISTICIAN reaches you, the first number of volume one of *Technometrics* will also be in the mails. This new journal of statistics for the chemical, physical, engineering and allied sciences is jointly sponsored by the American Society for Quality Control and the American Statistical Association. Its editor is J. Stuart Hunter at Princeton University. It is intended that *Technometrics* will be of material aid to those interested in the application of statistics to the physical sciences.

Not long after the establishment of the Section on Physical and Engineering Sciences (SPES), the membership of the Section was considering the possibility of a new publication devoted to statistical papers in the physical sciences. The topic was discussed over a period of time at business meetings of the Section and led to extensive investigations to assess the need for such a journal.

In early 1958 during a course at the Harvard Business School a group of members of SPES and the Chemical Division of ASQC met to discuss the project informally. It was the consensus that such a journal would fill a need and should be cosponsored by SPES and the Chemical Division. Conversations were held with prominent members of both societies to inform them of these aspirations and to help formulate the necessary policy decisions. In February, 1958 the Chemical Division allotted \$5,000 toward the launching of a new journal and in the Spring the Board and Council of ASA voted to support the project with an equal amount. The ASQC asked an Exploratory Committee to view the prospects more closely. After the recommendation of the committee, the Executive Council of ASQC voted to cosponsor the new journal. Thereafter a Management Committee was appointed to represent both societies in this undertaking.

The Management Committee is composed of seven members, three representing each society and a chair-

(Continued on Page 21)

NEWS

1959 ANNUAL MEETING ARRANGEMENTS—TRAVEL GRANTS AVAILABLE—BIOMETRIC SOCIETY (ENAR) ELECTS—B & E SECTION AWARDS AND PROCEEDINGS—MEETINGS, CONFERENCES, SEMINARS—PUBLICATIONS—JOB OPENINGS

Arrangements for 1959 ASA Annual Meeting

Plans for the 1959 Annual Meeting to be held December 27-30 at the Shoreham Hotel in Washington, D.C., are well under way. The Shoreham is known for its unusually good meeting room space. The meetings this year will be held jointly with a number of other associations and groups. As usual, the Institute of Mathematical Statistics and the Biometricians will be quartered in the same hotel (the Shoreham). The American Economic Association will have its headquarters in the adjoining Sheraton-Park Hotel and Raymond T. Bowman, the head of the Office of Statistical Standards, Bureau of the Budget, has been asked by the American Statistical Association and the American Economic Association to be their Chairman of the Joint Executive Committee on Local Arrangements. Other associations planning to meet at the same time in these and other hotels include the American Marketing Association, American Farm Economic Association, American Finance Association, American Association of University Teachers of Insurance, Catholic Economic Association, Econometric Society, Industrial Relations Research Association and the Regional Science Association. The composition of the ASA Local Arrangements Committee is as follows:

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ASA members are invited to submit papers for the Contributed Papers Sessions of the Annual Meeting to the Chairman of the Program Committee or to the appropriate Section program representative listed above. A convenient bulletin of abstracts of papers to be presented at all sessions will again be available at the Convention.

ASA Travel Grants for Attendance at International Conferences In 1959

The ASA Committee on International Conference Travel Grants has announced that applications will be considered for a limited number of grants to members of the Association to assist in defraying part of the travel costs of attendance at a number of international conferences scheduled to be held in 1959. The meetings for which travel grants may be awarded include:

International Population Conference, sponsored by the International Union for the Scientific Study of Population, Vienna, Austria, August 28-September 4, 1959;

Sixth Annual International Meeting of the Institute for Management Sciences, Paris, France, September 7-10, 1959;

Third International Congress, European Organization for Quality Control, Brussels, Belgium, Sept. 16-18, 1959.

In addition, the Committee will consider applications for travel grants to attend other international meetings within the scope of the ASA travel grant program which have not previously been brought to the attention of the Committee. The ASA program (which is financed by a three-year grant of \$9,000 from the Carnegie Corporation of New York, as announced in the October 1957 issue of *THE AMERICAN STATISTICIAN*) is designed to assist in defraying travel expenses of American statisticians attending scientific meetings abroad in which they would otherwise be unable to participate.

Grants are awarded under the ASA program only to individual members of the Association in the United States, Canada, or Mexico. The maximum amount of the individual grants will usually be the equivalent of the lowest round-trip airplane fare between a specified point in the United States and the place of the meeting.

Travel grants are awarded under the ASA program on the basis of criteria established by the Committee on International Conference Travel Grants, which reviews and decides upon all applications submitted. The principal criterion considered is the ability of the applicant (in the judgment of the Committee) to contribute significantly to the purposes of the meeting for

which the travel grant is sought. In judging relative value of potential contributions to the purposes of the meeting, the Committee takes into account the applicant's ability or opportunity to further his own research or scientific goals through attendance at the meeting; and the nature or purpose of the applicant's participation—e.g., whether to present a scientific paper, participate in a colloquium or symposium, serve as an organizer or chairman of a meeting or section, or serve as a designated representative of a group or organization. Special consideration may be given to the constructive contributions which younger statisticians might make to the purposes of the meeting. As the funds available for grants under the program are limited, the Committee also takes into account other sources of financial assistance or free transportation likely to be available to the applicant, and extent of previous attendance at international meetings.

Applications must be filed on forms prescribed by the Committee for the purpose. Copies of the application forms may be obtained from the offices of the American Statistical Association, 1757 K Street, N.W., Washington 6, D. C. In order to be considered for the program for 1959 meetings, completed applications must be received at that address on or before June 1, 1959.

The ASA Committee again reminds members of the Association that it will welcome suggestions as to international statistical meetings for which travel grants might be appropriate under the ASA program, (particularly meetings scheduled in 1960, which is the last year of the three-year period for which funds have been made available for the purpose). Such suggestions, or other recommendations relating to the program, should be addressed to the Executive Director of the Association.

New Officers of Biometric Society (ENAR)

The following officers were elected in the ballot of the Eastern North American Region of the Biometric Society:

Regional President '59—Jerome Cornfield, The Johns Hopkins University.

Regional President-Elect '59—Walter T. Federer, Biometrics Unit, Cornell University.

Regional Secretary-Treasurer '59—Theodore W. Horner, General Mills, Inc.

Regional Committee '59-'61—William G. Cochran, Harvard University; Boyd Harshbarger, Dept. of Statistics, Virginia Polytechnic Institute.

They will be ENAR officers subject to approval by the Council of the Biometric Society.

Awards for B & ES Section Papers

The Business and Economic Statistics Section endorsed a proposal at its annual business meeting to make awards to encourage writing of high-quality B &

ES papers. A committee headed by James Knowles recommended that the first awards be made in 1960. The papers given the first, second and third prizes would form a session at the ASA Annual Meeting to be held at Stanford University in late August of 1960. The principle of establishing such an award was approved at the annual business meeting, with details to be left to the committee.

Publication of 1958 Proceedings

The "Proceedings of the Business and Economic Statistics Section" has gone to press and should be available by the middle of April. This volume contains the papers presented at the sessions of the 1958 ASA Annual Meeting which were sponsored by the Business and Economic Statistics Section. A successful effort was made this year to speed the publication of the Proceedings. Copies may be obtained from the national office of the American Statistical Association, 1757 K St., N. W., Washington 6, D. C. at \$3.25 for members, \$3.75 for non-members.

Work on the "Proceedings of the Social Statistics Section" is nearing completion, and the volume should be available by late spring. This will contain the papers presented at the Social Statistics sessions of the Chicago meeting.

Annual Meeting of Operations Research Society

The seventh annual meeting of the Operations Research Society will be held on May 14 and 15, 1959, at the Shoreham Hotel in Washington, D. C. Sessions are being planned on:

- (1) Measures of effectiveness
- (2) New techniques and applications
- (3) Operations research in Government (non-military)
- (4) Operations research in the social sciences
- (5) Applications of operations research to the management of research.

Others may be added, and arrangements for small working panels may be made.

Further information about the meeting may be obtained from David A. Katcher, Chairman ORSA May Meeting, 4608 Morgan Drive, Chevy Chase 15, Maryland.

N. Y. Conference on Forecasting

The New York Chapter of the ASA is sponsoring an all-day conference on forecasting to be held at the Hotel Manhattan on April 23, 1959, as a memorial to the late Helen Slade, a former president of the Chapter who was an eminent analyst of stock market and financial conditions. Sessions on Business Forecasting, Sales Forecasting, and Stock Market Forecasting, as well as a Business Outlook Luncheon, are planned. A distinguished group of forecasting experts including Solo-

mon Fabricant, Gerhard Colm, Elmer C. Bratt, Burton Crane, Martin Gainsbrugh, Ralph Burgess, Louis Paradiso, Arthur Okun and Benjamin Lipstein, will be speakers.

The cost for attending the full-day session, including the Business Outlook Luncheon, is \$12; the price for the luncheon alone is \$6.50. Advance reservations are required. Reservations should be sent to Mrs. Virginia Holran, Institute of Life Insurance, 488 Madison Avenue, New York 22.

AAAS Sessions for Contributed Papers

Section K—Social and Economic Sciences—of the American Association for the Advancement of Science will hold sessions for contributed papers at the annual meeting of the AAAS in Chicago, December 26-31, 1959. Association members interested in presenting a paper at these sessions should forward titles and abstracts not later than September 20 to Donald P. Ray, Secretary of AAAS Section K, George Washington University, Washington 6, D. C. Papers should be based on recently completed research by the author. The American Statistical Association, which is an affiliate member of the Section on Social and Economic Sciences of the AAAS, will as usual help to organize a session or two.

Cornell Industrial Engineering Seminars

The annual industrial engineering seminars sponsored by the Department of Industrial and Engineering Administration, Sibley School of Mechanical Engineering, Cornell University, will be held at Ithaca, June 16-19, 1959. These seminars are designed for operating management personnel in industrial engineering, production engineering, engineering administration, research and development, quality control, cost accounting and cost production, production control, materials control, purchasing and data processing.

The program includes a series of seminar discussions covering each of the following eight areas:

- (1) Industrial management
- (2) Manufacturing engineering
- (3) Engineering administration
- (4) Small plant management
- (5) Methods and work measurement
- (6) Computers in production planning
- (7) Applied industrial and engineering statistics
- (8) Statistical aspects of component reliability

In addition, all participants attend general sessions. Speakers and discussion leaders will include specialists from both industry and the staff of Cornell University.

Further information may be obtained from Andrew Schultz, Jr., Department of Industrial and Engineering Administration, Upson Hall, Cornell University, Ithaca, New York.

Michigan Summer Engineering Conferences

The College of Engineering of the University of Michigan is offering a summer program of intensive non-credit courses for practicing engineers and scientists. Among the courses which may be of interest to statisticians are "Introduction to Standard Methods of Numerical Analysis", "Advanced Numerical Analysis", "Random Processes", "Foundations and Tools for Operations Research and the Management Sciences", and courses dealing with digital computer engineering and computer programming. Most of the courses are for two-week periods, beginning the middle or latter part of June 1959.

Interested persons should write to:

R. E. Carroll
Coordinator of Engineering Summer Conferences
2038 East Engineering Building
University of Michigan
Ann Arbor, Michigan

Alabama Electronic Data Processing Conference

The Fourth Annual Electronic Data Processing Conference will be held on the campus of the University of Alabama May 14-15, 1959. Sponsors of the conference include the University of Alabama, the Alabama Chapter of the American Institute of Electrical Engineers, the Alabama Chapter of the Society for the Advancement of Management, the Alabama Society of Certified Public Accountants, and the Alabama Chapter of the National Association of Accountants. An unusually fine program is being developed which will feature a number of nationally known authorities in the field.

Interested persons should write to Gordon E. P. Wright, Director of Commerce Extension Services, University of Alabama, University, Alabama.

New Editorial Staff for Mathematical Tables and Other Aids to Computation

A new editorial staff has recently taken over the direction of the quarterly journal, *Mathematical Tables and Other Aids to Computation*. The new Chairman of the Editorial Committee is Harry Polachek, Technical Director of the Applied Mathematics Laboratory of the David Taylor Model Basin. He succeeds C. B. Tompkins of the University of California at Los Angeles, who had held the post since 1954. The other members of the Editorial Committee are: C. C. Craig, A. Fletcher, E. Isaacson, D. Shanks, C. V. L. Smith, A. H. Taub, C. B. Tompkins and J. W. Wrench, Jr.

Mathematical Tables and Other Aids to Computation was founded in 1943 by R. C. Archibald with the aid is a grant from the Rockefeller Foundation and is published by the Division of Mathematics of the National

Academy of Sciences—National Research Council. It features original papers in numerical analysis, high speed computer methods and other aids to computation as well as short articles reporting upon the latest developments in these fields. It serves as an information center on tables and other aids to computation appearing in the current literature not only in the fields of mathematics, physics, statistics, astronomy and navigation, but also in such areas as actuarial science, aeronautics, chemistry, engineering, geodesy, medicine and meteorology. A file of unpublished mathematical tables is maintained for use by subscribers.

Articles for publication in *Mathematical Tables and Other Aids to Computation* should be addressed to

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Information on subscriptions may be obtained from

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Washington 25, D. C.

Statistical Research Monographs

The present Editorial Board of the *Statistical Research Monographs*, a series of publications established and co-sponsored by the Institute of Mathematical Statistics and the University of Chicago, consists of David Blackwell (University of California), William G. Cochran (Harvard University), Henry E. Daniels (University of Birmingham), Leo A. Goodman (University of Chicago), Wassily Hoeffding (University of North Carolina), Jack C. Kiefer (Cornell University), and William H. Kruskal (University of Chicago).

This series provides a medium of publication for material of interest to statisticians that is not ordinarily provided for by existing media. It attempts to fill the gap between journal articles and textbooks or treatises. Among the kind of publications included in the series are new research results too lengthy for the usual journal article, giving authors ample scope for detailed exposition of their findings; research results of interest in both theoretical and applied statistics; expository monographs in particular areas of statistics; and discussions of statistical problems and techniques in particular areas of application. Every attempt is made to maintain the highest standards of scholarship.

Authors are invited to send manuscripts and correspondence concerning the series to Leo A. Goodman, Department of Statistics, University of Chicago, Chicago 37, Illinois.

New Behavioral Science Computer Newsletter

The quarterly journal *Behavioral Science*, published by the Mental Health Research Institute of the University of Michigan, is adding as a new department a computer newsletter. This newsletter is intended to fill a gap in communication about the increasing use of high-speed computers by behavioral scientists.

The first number of the newsletter will appear in the April 1959 issue of *Behavioral Science*. The contents of this newsletter will consist of:

1. News items about installations, people, training courses, and computer programs.
2. Brief papers descriptive of integrated systems of data processing, computation, information retrieval or simulation.
3. Somewhat longer papers about more general topics related to computer usage or programming.
4. More theoretical papers about linear programming, machines that learn or play games, foreign language translation by machine, etc.

The committee responsible for the newsletter is: Steven G. Vandenberg, Mental Health Research Institute, University of Michigan; Bert F. Green, Lincoln Laboratories, Massachusetts Institute of Technology; Bruce MacKenzie, International Business Machines; John Mauchley, Remington Rand UNIVAC; Martin Rogoff, U. S. Bureau of Mines; and Charles Wrigley, Michigan State University.

Manuscripts can be sent to Dr. Vandenberg, Dr. Green or Dr. MacKenzie. The subscription price of *Behavioral Science* is \$5.00 a year to persons who identify themselves as members of a recognized national professional or scientific organizations; \$6.00 a year to others. Subscriptions should be sent to *Behavioral Science*, Mental Health Research Institute, University of Michigan, Ann Arbor, Michigan.

Job Openings

The Pan American Sanitary Bureau, the Regional Office for the Americas of the World Health Organization, has openings for statisticians both at its Washington headquarters and in the field. Most openings for senior staff call for either M.D. or Ph.D. degrees. Junior positions require a college degree with a combination of courses in mathematics and physical sciences and/or biological and social sciences, with good undergraduate training in statistics very desirable. A knowledge of Spanish is of great advantage. Bureau salaries are income-tax free, with dependents' allowance, allowance for expatriate service in field posts, and other benefits.

Interested persons should write to:

The Pan American Sanitary Bureau
1501 New Hampshire Avenue, N. W.
Washington 6, D. C.

(More Job Openings on Pages 12, 17, 22, 29)

International STATISTICAL ACTIVITIES

INTER AMERICAN STATISTICAL INSTITUTE

Mr. Tulo H. Montenegro, secretary general of IASI, represented the Institute at the first session of the **Advisory Committee on Science Development** of the Organization of American States, which was held in Washington, D. C., in June 1958.

Notes on new periodical publications announced by Argentina, Bolivia and Peru, included among the paragraphs below, were received from the IASI.

"METRIKA"

The Institutes of Statistics at the Universities of Berlin-Charlottenburg (West), Berlin-Dahlem (West), Berne, Geneva, Hamburg, Munich and Vienna have undertaken the publication of a **new statistical journal** called *Metrika*. The new journal is to be considered as the successor of the journals *Mitteilungsblatt für Mathematische Statistik* and *Statistische Vierteljahresschrift* which have ceased to appear.

Uniting the scientific staffs of the majority of the leading universities of the German speaking world—**Germany, Switzerland and Austria**, *Metrika* aims at the attainment of the following goals:

- (1) To cover the entire domain of Statistics, as both pure and applied theory.
- (2) To contribute to the understanding of the concepts and methods of Mathematical Statistics.
- (3) To propagate inquiries on the frontier of statistical science.
- (4) To stimulate international collaboration in the development of statistical theory.

Metrika publishes articles and book reviews in German, English and French. Manuscripts should be sent either to the German editor, Professor H. Kellerer, Head of the Institute of Statistics of the University of Munich, München 22, Ludwigstrasse 18/I, or to the Austrian editor, Professor S. Sagoroff, Head of the Institute of Statistics of the University of Vienna, Wien I., Rathausstrasse 19/II/3.

Chairmen of the Editorial Board for *Metrika* are **Professor O. Anderson**, University of Munich, and **Professor W. Winkler**, University of Vienna.

—Professor S. Sagoroff
University of Vienna

ARGENTINA

Beginning with January 1958, the Central Bank of the Argentine Republic issued No. 1 of *Boletín Estadístico*, a new monthly series of this bulletin, publication of which had been interrupted since September 1948. There

are several series which are being published for the first time, or which will now be published at more frequent intervals.

BOLIVIA

The Finance Section of the National Bureau of Statistics and Censuses (DNEC) has initiated the publication of the *Indice del Costo de Vida en la Ciudad de la Paz*, beginning with May 1958. This publication will appear monthly, supplementing the semiannual *Boletín Estadístico* of the DNEC.

GERMANY, WEST

The 29th annual meeting of the **Deutsche Statistische Gesellschaft** was held at Cologne in October 1958, under the chairmanship of Dr. K. Wagner. The principal addresses treated methodological questions of international comparison of price and purchasing power (Dr. A. Jacobs, Bremen), and problems of international comparison of living standards (Prof. Dr. Wagenführ, Luxembourg). Additional highlights of the meeting were papers on the firm as an object of statistical study (Prof. Dr. W. G. Herrmann, Cologne), and on description of types of firms on the basis of concepts of sociology and political science (Prof. Dr. G. Weisser, Cologne).

At a meeting of Subcommittee I on Market Research and Market Analysis, a problem of particular interest was that of taking account of qualitative changes in the framework of price statistics. A joint meeting of the Committee on Application of Statistical Methods in Industry and the Committee on New Statistical Methods considered special problems of acceptance-sampling. These committees also considered theoretical and practical problems of time series analysis and decomposition in the framework of modern business cycle research. The Working Group on Regional Statistics held a Conference on Foundations and Methods of German Industrial Location Structure. There was also a meeting of Subcommittee II on Internal Management Statistics.

A detailed report of the meeting was published in *Allgemeine Statistisches Archiv*, No. 4 (1958).

—Dr. Olaf Boustedt
Deutsche Statistische
Gesellschaft

ITALY

The Eighteenth Scientific Session of the **Società Italiana di Statistica** was held at Rome in June 1958. Officers of the society are Prof. Corrado Gini (presi-

dent), Prof. Fernando Pedroni (secretary general), and Prof. Bruno De Mori (treasurer).

The opening address, on the subject "Mathematics and Statistics", was delivered by Prof. Vittorio Castellani. He expressed the view that statistics, considered as a method, should not be considered exclusively as a branch of applied mathematics but should preserve that character as an autonomous science which it has been given in the Italian statistical tradition.

Papers presented at the meeting included:

"Juvenile mortality in recent Italian tables," Prof. Nora Federici,

"On evaluation criteria in sampling from the distribution of bank credits," Dr. Nicola Antamoro,

"Historical investigation of the evaluation of human capital," Dr. Aldo Santeusano.

The closing address, by Prof. Bruno Tenti, treated "Some considerations concerning financial statistics in Italy".

A volume of the *Atti* of the society, now in preparation, will contain the texts of the addresses and communications presented at the June 1958 meeting of the Society, and also texts of the communications presented at the meeting of the Italian Committee for Research on Income and Wealth. The *Atti* reports also the activities of the Faculty of Statistical, Demographic, and Actuarial Sciences of the University of Rome.

—Prof. Fernando Pedroni
Società Italiana di Statistica

NETHERLANDS

A subsidy obtained by the **Vereniging voor Statistiek** has made it possible to expand the society's quarterly journal *Statistica Neerlandica*, beginning in 1959. Each issue of the journal will be divided into two parts: a general part containing methodological articles, and a "section" part containing articles on problems in the areas of application represented by the Sections of the society.

The editorial committee for the general part is headed by Prof. J. Hemelrijk. Chairmen of the Section editorial committees are:

Industrial Applications: Dr. H. C. Hamaker

Medical-Biological: Dr. Chr. L. Rümke

Descriptive Statistics: Mr. W. H. Somermeijer

Economic Statistics: Prof. P. de Wolff

Operations Research: Ir. H. W. van den Meeren-donk.

The Mathematics Section will be served by the general part of the journal.

—*Statistisch Nieuws*
Rotterdam

A review article by Prof. D. van Dantzig (Mathematisch Centrum) on R. A. Fisher's *Statistical Methods and Scientific Inference* was published (in English) in *Statistica Neerlandica*, No. 4 (1957).

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PERU

The first annual statistical bulletin on hospital statistics in Peru has been published by the **Division of Biostatistics**, which is a part of the Health Statistics Program in the Inter-American Cooperative Service for Public Health. The report, *Estadísticas Hospitalarias en el Peru, 1955-1956* (Informes Bioestadísticos, No. 1, Dec. 1957), includes tables and analyses of both administrative and patient statistics. One feature of this bulletin is an experimental tabulation of 220,000 hospital patients based on a random sample.

USSR

A conference on probability theory and mathematical statistics was held by the Academy of Science of the **Armenian SSR** at Erivan in September 1958.

Major emphasis was given to papers on the theory of random processes and its application in various fields of science. Of particular interest were problems of queuing theory, game theory, and information theory.

One session, on applications of probability methods in astronomy and meteorology, was arranged by the **Bjuraka Astronomical Observatory**, whose director is Prof. V. A. Ambartsumian, President of the Armenian Academy of Science. Other sessions dealt with applications of probability and mathematical statistics in the organization of industrial production and technological processes.

—*Vestnik Ak Nauk SSSR*
[Bulletin Acad. Sci. USSR]

The librarian of the **Moscow Mathematical Association**, Professor E. B. Dynkin of Moscow State University, has written to the ASA to arrange an exchange of publications between the two associations. The Russian journal, *Trudy Moskovskogo Matematicheskogo Obshchestva*, which has been published since 1952, will be received by the ASA, starting with volume 7 (1958).

UNITED KINGDOM

The Royal Statistical Society celebrated its **125th anniversary** at a Dinner on March 17. The ASA was represented on this occasion by Dr. Churchill Eisenhart of the U. S. National Bureau of Standards. Dr. Eisenhart, a Vice-President of ASA, is visiting this year at the London School of Economics.

At a Research Methods Meeting of the Royal Statistical Society on March 4, Professor G. A. Barnard presented a paper on **Control Charts and Stochastic Processes**. The synopsis of this paper follows.

A new approach to, and new methods with control charts for industrial processes are suggested, based on the idea that the underlying stochastic process should be specified, its parameters estimated, and the control procedure related to these. Optimum estimators are derived, and practical approximations to these are indicated.

FEDERAL STATISTICAL ACTIVITIES

Revised Indexes of Prices Paid and Received by Farmers

Revisions were announced in January by the Department of Agriculture for the Index of Prices Paid by Farmers, Including Interest, Taxes, and Farm Wage Rates (the "Parity Index") and the Index of Prices Received by Farmers for Farm Products. The revision of these indexes encompasses three main features: (1) Revision of weighting factors for individual commodities and services and for the several commodity groups; (2) linkage of the new indexes to the former series as of September 1952; and (3) expansion and improvement of the commodity coverage. The weight base period has been shifted from 1937-41 to 1955 in the case of the Parity Index, and to 1953-57 in the case of the Index of Prices Received by Farmers. The general pattern and structure of the indexes, as carried since 1950, have been retained.

For the *Parity Index*, the new weights are based primarily upon data collected early in 1956 in a nationwide survey of farm expenditures for the calendar year 1955. Data from this survey were supplemented by information on food expenditures obtained in a nationwide survey of household food consumption sponsored by the Department of Agriculture in the spring of 1955. Other official data of the Department of Agriculture, including detailed information on fertilizer consumption supplied by the Agricultural Research Service at Beltsville for the year ended June 30, 1955, were also utilized in revising the weights.

The new weighting pattern results in the following changes in weights for major components of the Parity Index from the weight base period 1937-41 to 1955:

	Percent 1937-41	Percent 1955
Commodities used in—		
Family living	44.0	39.50
Production	41.2	50.90
Total commodities	85.2	90.40
Taxes	3.8	2.04
Interest	3.0	.96
Cash wage rates	8.0	6.60
	100.0	100.00

September 1952 was selected as the linkage date for incorporating the 1955 weighting pattern into the Prices Paid Index series primarily because it was at about this period when price levels for items used in family living and in farm production began to diverge, after moving closely together with the general advance in price levels from 1932 to 1952. The expenditure data for 1955 reflect distribution of expenditures after this divergence

and are therefore better than the earlier weights, based on the period 1937-41, in representing conditions from 1952 forward.

A complete review of available price series in the light of purchase patterns reflected by the survey of expenditures in 1955 resulted in some changes in the commodities included in the revised Parity Index. In general, items were included that contributed more than one-half of 1 percent of the total expenditure by farmers for items in the particular group. As a result, 136 price series have been added to the list of 340 in the former index, and 71 have been dropped.

The *Index of Prices Received by Farmers* has also been revised to incorporate post-World War II weights. Annual marketing data are available for farm products, making possible the use of average annual marketings for the period 1953-57 as weights. The five-year period presents a more stable weighting pattern for farm product prices than data for a single year, as a result of smoothing the year-to-year variation in farm output resulting from weather and economic factors. As a result of the revision, the weight of "All crops" increased from 42.2 percent in the weight base period 1937-41 to 45.2 percent in the new weight base period 1953-57; and the weight of "Livestock and products" decreased from 57.8 to 54.8 percent. This index also was linked in September 1952. In addition to weight changes, there have been some changes in the methods of handling prices of certain crops, particularly commercial vegetables and fruit, resulting in a somewhat reduced seasonal fluctuation for these commodity groups.

The revised Index of Prices Paid by Farmers for Commodities and Services, including Interest, Taxes, and Wage Rates was about 4 percent lower for December 15, 1958 than the unrevised index. The revised Index of Prices Received for Farm Products was a little less than 1 percent under the old index for the same date. As a result, the revised Parity Ratio for December was 3 points higher than the unrevised Parity Ratio—i.e., 83 as compared with 80.

The revised figures for the major components of both indexes (by months from September 1952 through December 1958) and a brief description of the method followed in revising the indexes are given in Supplement 1 of the January 1959 issue of *Agricultural Prices*. This bulletin is available on request to the Agricultural Estimates Division, Agricultural Marketing Service, U. S. Department of Agriculture, Washington 25, D.C.

—B. Ralph Stauber, Chief
Agricultural Price Statistics Branch,
Agricultural Marketing Service,
Department of Agriculture

Study of Composition of Payroll Hours

The Bureau of Labor Statistics has begun a survey of the composition of payroll hours. The object of the study is to determine the relationship between the various components of hours paid for—e.g., plant man-hours, paid vacations, paid sick leave, and paid holidays.

The present survey is limited to production workers in manufacturing industries, but plans for subsequent surveys include nonmanufacturing industries as well as other workers in manufacturing industries. Repetition of these studies at later periods will give information on the trend of plant man-hours in relation to total hours paid for, and thus will provide a basis for improvement of productivity estimates.

A probability sample of about 8,000 establishments will be used in the survey, providing information at the 2-digit industry level.

—H. M. Douty, Chief, Division of
Wages and Industrial Relations,
Bureau of Labor Statistics,
Department of Labor

Program Evaluation and Review Technique

The Navy's Special Projects Office, charged with developing the Polaris-Submarine weapon system and the Fleet Ballistic Missile capability, has developed a statistical technique for measuring and forecasting progress in research and development programs. This Program Evaluation and Review Technique (code-named PERT) is applied as a decision-making tool designed to save time in achieving end-objectives, and is of particular interest to those engaged in research and development programs for which time is a critical factor.

The new technique takes recognition of three factors that influence successful achievement of research and development program objectives: time, resources, and technical performance specifications. PERT employs time as the variable that reflects planned resource-applications and performance specifications. With units of time as a common denominator, PERT quantifies knowledge about the uncertainties involved in developmental programs requiring effort at the edge of, or beyond, current knowledge of the subject—effort for which little or no previous experience exists.

Through an electronic computer, the PERT technique processes data representing the major, finite accomplishments (events) essential to achieve end-objectives; the inter-dependence of those events; and estimates of time and range of time necessary to complete each activity between two successive events. Such time expectations include estimates of "most likely time," "optimistic time," and "pessimistic time" for each activity. The technique is a management control tool that sizes up the outlook for meeting objectives on time; highlights danger signals requiring management decisions; reveals and defines both criticalness and slack in the flow plan or the net-

work of sequential activities that must be performed to meet objectives; compares current expectations with scheduled completion dates and computes the probability for meeting scheduled dates; and simulates the effects of options for decision—before decision.

The concept of PERT was developed by an operations research team staffed with representatives from the Operations Research Department of Booz, Allen and Hamilton; the Evaluation Office of the Lockheed Missile Systems Division; and the Program Evaluation Branch, Special Projects Office, of the Department of the Navy.

—Willard Fazar, Head,
Program Evaluation Systems Section,
Special Projects Office,
Department of the Navy

General Aviation Air Traffic Survey

A large-scale general aviation air traffic survey sponsored by the Bureau of Research and Development of the Federal Aviation Agency is being made on a nationwide basis to collect detailed information on general aviation air operations. The survey was designed by and will be conducted by Booz, Allen and Hamilton, Inc. The survey is part of a comprehensive research endeavor in the air traffic measurement field.

The complete survey plan includes collection of detailed information on air carrier and military as well as general aviation operations. While airline activity patterns are readily available, and the military services are supplying their activity information through systematic record-keeping, the general aviation survey depends upon the contributed services of the aviation community, since general aviation has a very mixed type of activity involving many thousands of individual aircraft.

The general aviation portion of the survey, which was begun in January, will be accomplished by a field survey in which pilots of aircraft that take off or land at selected airports during a designated period will be interviewed. The interviews will be conducted by Civil Air Patrol supervisors and cadets. Information to be obtained in the survey includes: time of takeoff, point of takeoff, cruise altitude, speed, flight destination, time of landing, and weather. The field survey will be conducted in two phases—the first in January and the second in June and July 1959. After completion of the summer survey, over 600 airports will have been surveyed in 36 states. During the January survey, information was obtained during four periods of four days each. Each four-day sample extended from midnight Wednesday through midnight Sunday for a selected group of airports in 21 States. The January general aviation survey covered 251 airports in Alabama, California, Colorado, Florida, Georgia, Illinois, Indiana, Iowa, Kentucky, Massachusetts, Michigan, Minnesota, Missouri, Nebraska, New Hampshire, North Dakota, Ohio, Oregon, Rhode Island, Texas, and Wisconsin.

The overall air carrier, general aviation and military air traffic survey, of which the field survey covering general aviation is one part, is a comprehensive study in air traffic measurement. It is intended to expand the scope of previous investigations made by other civil aviation organizations. The survey information will be used to develop a new mathematical method that permits more accurate calculation of present and future estimates of air activity. The method will be applied to forecast air traffic for periods through the year 1980. Scientifically planned so the results make possible creation of mathematical models or formulas, the survey data will be put on punch cards and processed by a large computer to reconstruct mathematically the air traffic of the United States. The survey plan calls for the entire nation to be divided into geographical "cells." From the cell configuration will come these basic measures of nationwide traffic, and improved forecasting capability: (1) Air traffic flow between appropriate airports and/or metropolitan areas; (2) instantaneous airborne traffic over any specified area of the nation, by cell; (3) aircraft movements (departures and arrivals), by airport and by cell; and (4) mathematical method for rapid calculation of present and future traffic in terms of measures 1, 2, and 3.

The data will be used by the Operations Analysis Directorate of the Bureau of Research and Development to forecast demands upon the nation's airport, communication, navigation and traffic control facilities.

—Richard H. Jordan, Director
Bureau of Research and Development,
Federal Aviation Agency

Survey of Domestic Airline Passenger Traffic

On January 1, 1959, the sample design used in the Civil Aeronautics Board domestic "Origin and Destination Survey of Airline Passenger Traffic" was changed. Previously, the data reported to CAB on the origin and destination of airline passengers in the United States were based on all tickets during two weeks in March and two weeks in September of each year. Under the new plan, a 10 percent continuous systematic sample of tickets will provide the basis for the reports. This change in sample design has been the result of joint cooperation between the CAB, the air carriers, and the Air Transport Association.

Under the new sample design, domestic operations are to be sampled continuously by the carriers on a daily basis, and then consolidated into quarterly totals for each calendar quarter of the year. However, until such time as improved processing facilities are available to the CAB, the carriers will also summarize the four quarterly reports of the calendar year into two six-month summary reports. All four of the quarterly reports and both of the six-month summaries are to be submitted to the Board.

The domestic survey will continue to be conducted chiefly on the basis of "tickets sold" rather than "tickets used." A procedure to adjust "tickets sold" for refunds was initiated for the first time in order to provide a closer measure of actual tickets used. As a first step in this new procedure, the sample will exclude tickets sold that are completely refunded. A procedure to adjust for tickets partially refunded has yet to be developed.

The International Origin and Destination Survey of air passengers, which is based on "tickets used" during the months of March and September, is not being changed at this time, but will be studied with the objective of inaugurating continuous sampling when feasible.

—William Weinfeld, Chief, Research
and Statistics Division, Office of
Carrier Accounts and Statistics,
Civil Aeronautics Board

State and Local Government Finances in 1957

A report on *State and Local Government Finances in 1957* was issued in February by the Bureau of the Census as Advance Release No. 8 of the 1957 Census of Governments. Local governments in the United States received \$29 billion of revenue in fiscal 1957, and made expenditure (including amounts financed by borrowing) that totaled \$31 billion. Their indebtedness at the end of fiscal 1957 amounted to approximately \$39 billion. Each of these sums is about three times the corresponding total at the end of World War II. For a number of years, however, this marked expansion in the scale of local government finances has been measured only on an overall nationwide basis. Not since 1953 have State-by-State data been available on revenue of all local governments, and not since the 1942 Census of Governments have statistics by States been reported concerning expenditure and debt of local governments.

The report presents results of the financial survey made as part of the 1957 Census, involving the collection of some financial data from each of the more than 100,000 local governments in the United States and detailed financial data from a stratified random sample of about 18,000 units. Figures are given for each State area, by type of government, on (1) revenue by source; (2) expenditure by function (20 categories) and by character and object; (3) indebtedness and debt transactions; and (4) cash and security holdings. Copies of the report (76 pp., \$1.00) may be purchased from the Bureau of the Census, Washington 25, D. C., or from field offices of the Department of Commerce.

Findings from the 1957 Census of Governments have made possible improved design of local government samples for regular annual surveys of the Bureau of the Census. State-by-State estimates of employment and payrolls, by function, are hereafter to be based on a sample that includes about 9,500 local units—considerably fewer

than were formerly canvassed for this survey. The sample used to derive annual nationwide statistics on local government finances, by type of government, has been redesigned but will be about the same in total size as formerly—comprising about 2,300 units. In addition, however, a supplementary panel of local governments will also be canvassed for key financial amounts. The combined coverage is intended to yield annual estimates on a State-by-State basis for major categories of State-and-local government revenue, expenditure, indebtedness, and financial assets, beginning with data for fiscal 1958.

—Allen D. Manvel, Chief,
Governments Division,
Bureau of the Census,
Department of Commerce

Among Recent Publications—

Health Statistics from the U.S. National Health Survey, issued by the Public Health Service, Department of Health, Education, and Welfare. Additional reports issued in Series B (Results from the Household Interviewing):

Series B 6, "Acute Conditions, Incidence and Associated Disability, United States, July 1957-June 1958," presenting statistics on incidence of acute conditions and number of associated restricted-activity days, bed-days, work-loss days, and school-loss days according to condition group (infectious and parasitic diseases, respiratory conditions, digestive system conditions, injuries, all other acute conditions). (35 cents)

Series B 7, "Hospitalization—Patients Discharged from Short-Stay Hospitals, United States, July 1957-June 1958," presenting statistics on socio-economic characteristics, hospital ownership, length of stay, hospitalized condition, and number and type of surgical cases. (30 cents)

Copies of these reports may be purchased at the prices indicated from the Superintendent of Documents, Government Printing Office, Washington 25, D. C.

Relationship of Prices to Economic Stability and Growth, issued by the Joint Economic Committee, U. S. Congress. Hearings held December 15-18, concluding the special study of prices made by the Committee in

1958 (859 pages, \$1.25). Commentaries of the invited experts from labor and industry issued separately in advance of the hearings (271 pp., 65 cents). Both documents available from the Superintendent of Documents, Government Printing Office, Washington 25, D. C.

Economic Policy Questionnaire, issued by the Joint Economic Committee, U. S. Congress. Tabulations of replies to an economic policy survey of academic economists, made last October by the Subcommittee on Economic Stabilization. Available (18 pages, 15 cents) from the Superintendent of Documents, Government Printing Office, Washington 25, D. C.

Experience of Claimants Exhausting Benefit Rights Under Unemployment Insurance—17 Selected States, issued by the Bureau of Employment Security, Department of Labor. Report on the findings of surveys of the experience and characteristics of unemployed workers who have used up all of their unemployment insurance, conducted by 17 State employment security agencies during varying periods from 1954 through 1956. The report describes objectives and uses of post-exhaustion studies and analyzes characteristics of exhaustees (e.g., sex, age, industry, occupation) and their labor market status (employed, unemployed, or withdrawn from the labor market) two and four months after exhaustion of their State unemployment insurance benefits. Available from the Publications Branch, Bureau of Employment Security, Department of Labor, Washington 25, D. C.

SENIOR STATISTICIAN CAREER OPPORTUNITY with the New York State Education Department. Salary range \$6098 to \$7388 in five annual increments. Numerous employee benefits including job security, promotional opportunities, liberal vacation and sick leave, retirement, social security and comprehensive health insurance.

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EDUCATIONAL AND TRAINING FILMS IN STATISTICS*

Grant I. Butterbaugh

University of Washington

At the outset it would be well to state that in this paper the expression "education" is the general and formal word for schooling of whatever sort, especially as gained in an institution of learning. To be educational, a film must advance the education or knowledge of the audience. Training suggests exercise or practice to gain skill, endurance, or facility; to drill or teach; to impart proficiency by discipline. With these definitions in mind, it will be seen that real training films are about as plentiful up to this time as are successful rockets to the moon.

Until now companies producing educational films have definitely ignored the field of statistics. Here and there among some 18,000 educational films listed in the film guides one may find a film dealing with arithmetic, such as "Division is Easy," "Decimals are Easy," "Percent in Everyday Life." These are for the grade schools. Knowledge Builders, a film producer, has issued some 24 films of 10 or 11 minute duration on Geometry, two of which are abstracted below. These are for high school use. There are very few films that are especially adapted for the college level of education.

The reasons for lack of interest in the subject of statistics seem obvious. Although films such as "Toads," "Ostrich Farming in South Africa," "How to Make a Buttonhole," or "Basketball Fundamentals" may not be easier to make than films on "Multiple Correlation" or "Significance Tests," one must admit that it is undoubtedly much more profitable for the film companies to cater to the education of millions of children of all ages, than to the relatively few adults who are interested in learning statistical theory and techniques. When one thinks of the sales potential of presently obtainable films such as "The Midnight Ride of Paul Revere," "City Firefighters," "Carnival Comes to Town," "Gold Rush Days," or "Earning Money while Going to School" compared with the potentially desirable films (from our standpoint, at any rate) for specialized college students and adults on such subjects as "The Analysis of Variance," "Statistical Decision Theory," and so forth, he is forced to admit that if he were in the educational film business, he too would very likely have ignored the field of statistics as a very limited market.

Scanning the catalogue of the Coronet Films, "the world's largest producer of educational films" by their own admission, I found that out of some 800 educational films listed there were less than a dozen, nine, to be exact, that were slanted toward junior and senior high school

mathematics, and only one that might be suitable for students of college statistics. Typical of these one-reel, 11-minute films are such titles as:

Algebra in Everyday Life
Geometry and You
The Meaning of Pi
The Language of Graphs

These films are priced from \$45.00 to \$56.25 in black and white; \$90.00 to \$112.50 in color.

I would say that Coronet Films has only one film which might be of interest to members of this association as an educational and training aid; it is called "Using the Scientific Method." This film begins with the definition of an everyday problem, shows the steps of scientific method, through collection of information, formation of a hypothesis, and the experimental testing of the hypothesis to retesting of the results obtained. Objectivity and precision, attitudes necessary for successful work in science, are stressed. The film is more particularly adaptable for the education of juniors and seniors in high school than for college students and is definitely not a training film. This 1-reel, 11-minute production may be had in black and white for \$55.00 or in color for \$100.00.

According to Coronet Films "every effort has been made to uncover areas in which teaching films could make the greatest contribution . . . thus the Coronet program develops from teaching needs and tries to answer those needs with useful films." Apparently there has been no real demand up to this time for film companies to make films for training in statistics. For various reasons we teachers of statistics have not made a definite drive to obtain such training aids. We have not concentrated on having our technical and professional organizations establish film committees and film libraries. We have, on the other hand, paid a great deal of attention to filling our college libraries with the latest books, journals, and brochures on statistics. There has been no concerted effort toward urging films for education and training in statistics and so this field has been by-passed in the audio-visual education movement.

McGraw-Hill Book Co., another great producer of text-films, has but one film out of some 375 listings which would qualify as an education film for statisticians. A synopsis of this 10-minute film on "Quality Control" is given below as item 13.

In a search through some 18,000 films listed in the film guides and otherwise only 30 have been found which seem to pertain to the field of statistics. Half of these are films about the advantages, uses, and methods of

* This and the following two articles were adapted from papers and discussion given by the authors at the December 1958 meetings of the American Statistical Association in Chicago, Illinois.

quality control. This is by no means considered to be a complete list of films that might be of some educational value for statisticians. There must be numerous other documentary films that would be of some interest to some people.

Perhaps very few persons actively engaged in the teaching of statistics could countenance a course of training that did not include the working of problems. There can be no adequate substitute for the working of problems if one is to learn statistical techniques rather than to just learn about them. One might as well imagine training in swimming or horsemanship without the trainee ever entering the water or mounting a horse. A picture of the process may be interesting and entertaining, and it is undoubtedly capable of transmitting some pointers through the visual experience of watching another person in action. However, until a person tries to do the job himself he cannot be trustworthily trained. Nevertheless, as an adjunct to lectures, problems, and the study of textbooks, we might well use supplementary materials such as films to good advantage, provided those films were prepared with statistical education and training in mind, not simply for entertainment. A few educational films could provide a change of pace from lectures and book study, and thus enliven a course of instruction. This can be overdone, however. Films have an aspect of entertainment about them which makes audio-visual education somewhat palatable to the student.

It seems to me that unless a film can be worked into a lecture in such a manner that it can be used in the exercising of the auditor's ability to carry out a technique, or give him a chance to participate, it does not have the element of discipline which we think of in connection with training—as distinguished from general education.

Up to date I can think of only one real training film in statistics. That one is listed below in item 11. The Work Sampling Demonstration film was used by Mr. C. L. Brisley (See Quality Control Conference Papers 1953—A.S.Q.C., pp. 115-125) at the Philadelphia convention in an excellent illustration of how observers may be trained by the use of films. The audience was given a background of work sampling and the technique was explained. Then with the aid of a work sampling observations sheet entries were made while a 20-minute film was run showing operations in a hospital laundry. Finally, calculations were made and conclusions drawn. Time was divided: explanation 10 minutes, film 20 minutes, calculations 10 minutes. The audience took part in the work sampling study just as if it was in the hospital laundry passing this operation at random intervals.

There is another area of audio-visual education which we might investigate with perhaps greater rewards than from motion picture films. That is the filmstrip field. A filmstrip is a roll of film, a series of pictures, which has not been cut into transparencies for slides. These film-

strips are inexpensive running from \$2.00 to \$5.00, compared with from \$30.00 to \$250.00 for a film. Filmstrips can contain from 25 to 50 frames or pictures per strip, and have the advantage that they can be shown at any speed desired or stopped for discussion. Filmstrips can be geared to a gramophone record like a sound film but in that case the speed is set and the filmstrip cannot be conveniently stopped, slowed down, or turned back at will.

While there are a number of filmstrips available for the teaching of algebra, geometry, integral calculus, and general mathematics, only two pertaining directly to statistics have come to my notice in checking a guidelist of some 13,000 filmstrips. One of these is a strip of 40 pictures in Set No. 2 of Industrial Management, McGraw-Hill, 1952. It rents for \$4.00 and pertains to production control, methods analysis, job evaluation, and quality control.

The other filmstrip dealing with statistics is composed of 42 frames and is called "Collection of Data"; it was produced by City College, New York in 1953. This filmstrip explains a statistical population, enumeration, sample, right and wrong questions for a questionnaire, statistical questions, schedule, six steps in field work, the census survey, primary data, editing, hand and semi-mechanical methods of sorting, and machine tabulation. As an editorial comment I might say that I thought the gramophone text seemed too rapid for the clear elucidation of the pictures, and the forms illustrated were in some instances too small for the audience to read. These are faults in production which could be overcome and in no way detract from the basic idea of the filmstrip nor from the material shown in this particular strip of pictures.

In closing this brief discussion I wish to make the suggestion that the American Statistical Association begin looking into the field of audio-visual education and training through films and filmstrips to the end that educational film producers be induced to work in the area of statistics. We ought to provide teachers in schools, colleges, and industry with material that can be applied along with lectures and problem material for the stimulation of discussion, the enlivening of the subject with a change of pace, and training through various types of audience participation.

APPENDIX A. Abstracts of films in statistics

1. Rectangular Coordinates (1944)

U. S. Navy

United World Films, Inc.

1445 Park Avenue, New York 29, New York

13 min., sound, black and white, \$27.30.

Demonstrates how to use coordination in solving problems involving time and distance, and how to locate a point using two coordinates.

2. Rectangular Coordinates (1946)
Knowledge Builders
625 Madison Avenue, New York 22, New York
12 min., sound, black and white, \$40.00; rent \$2.00.
Shows how a point moves and becomes a line. After explaining positive and negative numbers from coordinate positions, it branches into tri-dimensional areas.
3. Slide Rule: "C" and "D" Scales
U. S. Office of Education
Washington, D. C.
23 min.
4. Slide Rule: Proportions, Percentages, Squares, and Square Roots
U. S. Office of Education
20 min.
5. Vectors (1945)
U. S. Navy
United World Films, Inc.
12 min., \$20.11.
Explains the plotting and solution of vectors.
6. Introduction to Vectors: Coplanar Concurrent Forces
U. S. Office of Education
22 min., sound, black and white, \$34.31.
Accompanying filmstrip \$1.25.
Explains the meaning of scalar and vector quantities and how to add them; explains the various methods of vector composition and vector resolution; and shows how vectors may be employed to solve engineering problems.
7. Ratio and Proportion
Knowledge Builders
11 min., sound, black and white \$40.00; rent \$2.00.
Applications to real life situations. The "Product of means equals product of extremes" theorem is covered in detail.
8. Periodic Functions
U. S. Navy
United World Films, Inc.
17 min., sound, black and white \$34.73.
Defines periodic functions; illustrates the graphing of sine angles; and relates sine waves to the amount of voltage produced by a generator.
9. Public Opinion (1946)
Encyclopaedia Britannica Films Inc.
1150 Wilmette Avenue, Wilmette, Illinois
10 min. Rent \$2.25.
Describes the nature and development of public opinion, factors influencing it, and methods of measuring it.
10. Introduction to Work Sampling
University Extension, Educational Film Sales Dept.
University of California, Los Angeles 24, California
16 mm color/sound; 20 min. color \$175.00, rent \$6.00; black and white \$80.00, rent \$4.50.
Shows how random sampling may be used for measuring work as well as measuring delays and idle time. By means of a large panel containing 480 wood blocks representing the 480 minutes of a work day, the film explains and demonstrates how a random sample can be used to predict the whole. A good basic approach to work sampling in clear and simple language. Emphasizes the use of a table of random numbers to obtain a sample for analysis of work and idle time.
11. Work Sampling Demonstration (1953)
Wolverine Tube Division
Industrial Engineering Section
1411 Central Avenue, Detroit 9, Michigan
20 min., sound, black and white \$75.00; free loan.
To demonstrate work sampling by audience participation. Audience uses work sampling tally sheets during film showing the pressing of uniforms in a hospital laundry, breaking down the operation into 5 elements. Film points out that random observations made by audience give fairly accurate results, and that the accuracy increases when the comments made by the participants in the demonstration are accumulated.
This film was used in a demonstration by C. L. Brisley at the Philadelphia convention of A.S.Q.C. (See—Quality Control Conference Papers 1953, pp. 115-125. "Work Sampling (Ratio Delay Study) Techniques") In using the film the audience was given a background of work sampling, the technique was explained, then with the aid of a work sampling observations sheet entries were made while the film was being shown. Time was divided: explanation 10 min.; film 20 min.; calculations and conclusions 10 min.
12. Time Study Methods
Methods Engineering Council
Management Consultants
718 Wallace Avenue, Pittsburgh 21, Pa.
16 mm., color/sound; 19 min.
Shows how up-to-date and proven time study methods can be applied to an actual operation in the shop. Since the procedure is basically the same for any operation, the principles explained in this film can be applied to the operations that exist in any plant.
13. Quality Control
McGraw-Hill Book Co.
330 West 42nd St., New York 36, N. Y.
10-15 min. \$70; follow up filmstrip \$5
Shows how industry controls the quality of its products by keeping check on the variable factors in manufacturing; men, materials, machines, manufacturing conditions, etc.; and that a good quality program boasts the production of acceptable goods and cuts down scrap and waste. Describes the factors to be considered in setting quality standards, the function of an inspection system in the quality control program, and the effect of higher or lower quality standards on manufacturing cost and selling price. Explains the use of statistical techniques based on the principles and methods of the sampling process. Illustrates the laws of probability and expectancy. Use of tables and control charts.
14. Modern Quality Control
Johns-Manville Corporation
Attention: Mr. Simon Collier
22 E. 40th St., New York 16, N. Y.
20-25 min., color/sound
A good film bringing into play controls in the actual production plant with pictures of production. Film owned by the corporation can only be seen when it is accompanied by a company representative. It is said this film cost about \$250,000 to produce. This is perhaps the premiere film on quality control.
15. Fundamentals of Quality Control (1953)
Methods Engineering Council
16 mm., color/sound; Price \$252.00, rent \$18.00

- Illustrates the building of distribution curves and the use of these curves in controlling quality. It is a film intended for production men, engineers, executives, and foremen. This film, produced in conjunction with the York Corporation, shows development of curves of distribution and how a knowledge of the laws of chance can be very useful in controlling quality on many different types of jobs. Action centers around the production of compressor pistons and other parts. Since many production men, as well as executives, untrained in the fundamentals of quality control, believe those fundamentals to be complicated and slightly impractical, this film will help to change their minds.
16. Acceptance Sampling (1951)
U. S. Air Force
Public Information Officer
Air Material Area Headquarters nearest you;
also United World Films, Inc.
Order No. MF 6621-B; black and white, sound, \$32.98
Statistical methods employed in acceptance sampling. Use of Military Standards 105A by government inspectors responsible for acceptance of products. Sampling vs. 100 per cent inspection. Explanation of A.Q.L. Use of single sampling plan, double sampling, and multiple sampling.
 17. Process Control (1951)
U. S. Air Force
also United World Films, Inc.
Order No. MF 6621A; black and white, sound, \$21.51;
UFW rental \$1.75
Statistical methods involved in process control as a means of obtaining for the government a better product at a cheaper price. Mass production; statistical quality control chart; frequency distribution curve.
 18. Evaluation of a Quality Control System
Army Ordnance
Lorber,
A. O. Inspection Corps
Washington, D. C.
G. 14461; 20 min., color/music
Ordnance quality assurance. Emphasis 90% on philosophy of total quality control based on Feigenbaum's ideas; 10% statistics. Taken at Aberdeen Proving Grounds with Ordnance Tank Ordnance Command and Allison Division of General Motors participating. Scenes in checking inspection and testing test procedures and records. Inspection team goes through Allison Division checking on all phases of inspection, testing, plating, packing, shipping, gage control, etc.
 19. Quality Control in Modern Merchandising
Association Films, Inc.
Broad and Elm
Ridgefield, N. J.
25 min., color. Free rental
This film is sponsored by J. C. Penney Co., and shows the machines and methods that are used to test the toughness of shirts, sheets, blankets, trousers, shoes, and other articles.
 20. Concrete Quality Control Tests
University Extension, University of California
20 min., color/sound
Of general quality control interest. Shows the care used to control large quantities of cement. The tests demonstrated include the slump, Kelly-Hall, air volume, compressive, and impact hammer.
 21. Quality Control in the Mining Industry
Department of Mines and Technical Surveys
114th St., and 87th Avenue
Edmonton, Alberta
16 min., black and white, sound. 700 ft. film
Depicts a coal washery in which the performance of a coal cleaning unit is guided by systematic sampling and the application of statistical methods to control the ash content of the clean coal within predetermined limits.
 22. Quality in the Making (1945)
General Motors
Schenectady, N. Y.
23 min., black and white, sound. Free rental
Presents the various processes in the production of ball bearings at the New Departure Division of General Motors Corporation.
 23. Research in Steel
U. S. Steel Corporation
525 William Penn Place, Pittsburgh, Pa.
26 min. 16 mm.—1 reel 1200 ft.
35 mm.—1 reel 1000; 1 reel 2000
Emphasizes the role of research in the development of new steel products and illustrates the general character of steel research carried on at the Monroeville Research Center. Especially prepared for non-technical groups.
 24. Paths of Steel
U. S. Steel Corporation
26 min. color; sound. 16 mm.—1 reel 1200 ft.
35 mm.—1 reel 1000; 1 reel 2000 ft.
The engineering and technical aspects of men and machines in modern research as conducted at the Monroeville, Pa. Research Center. Illustrates the use of various scientific instruments such as the micro-manipulator, X-ray micro-analyzer, Beta-ray gage, micro-hardness tester, and emission spectrophotograph. Especially suitable for engineering students and technical associations. Available for Television.
 25. Gaging for Profit
Federal Products Corporation
1144 Eddy St., Providence, R. I.
38 min.; 16 mm., color/sound
 26. Optical Gaging
Optical Gaging Products, Inc.
26 Forbes St.,
Rochester, N. J.
 27. Quality Control in Photographic Lenses (1953)
Eastman Kodak Co.
Rochester, N. J.
25 min.; sound/color. Free loan
Follows a typical lens through production at the Hawk-Eye Works of Eastman Kodak Co. Stresses the importance of cleanliness, skill, and quality control in producing fine lenses.
 28. Figures of Quality (1950)
Hercules Powder Co.
10 min.; sound/color. Free loan
Shows the making of a batch of synthetic resin at the Burlington Works of Hercules Powder Co. Hercules uses statistical quality control methods in one form or another in almost all its manufacturing operations and in its research and development work at the experiment station.

29. Environmental Factors Affecting Reliability of Electronic Equipment

Department of the Navy
Attn.: Comdr. R. C. Wing
Bureau of Ships—Code 258-16
Washington, D. C.
16 mm.; black and white with sound
Explains the need for, and the means of testing the various environmental conditions.

30. The Priceless Component or A Life in Your Hands

Hughes Aircraft Co.
Attn.: Mr. G. W. Perkins, Supervisor,
Audio-Visual Arts
Culver City, Calif.
20 min.; 16 mm.; color; sound; music
Stresses reliability and quality. In the story portrayed an executive of the airplane company is called upon by two suppliers of components used in his product. An effort is made by the executive to impress these vendors with the penalties that follow when quality of supplied parts is slighted.

APPENDIX B Filmstrips

Modern Instructions Films, Brooklyn, N. Y. (1947) black and white; \$4 each, \$15 a set.

Basic Algebra—7 filmstrips

Plane Geometry—12 filmstrips

Using Geometry—4 filmstrips

Integral Calculus

Areas by integration—40 frames

Double integrals—43 frames

Triple integrals—40 frames

Areas by integration using polar coordinates—34 frames

McGraw-Hill Inc.

330 West 42nd St., New York 36, N. Y.

Industrial Management (1952)

Set 2; 40 frames, \$4.00

Consists of Production control

Methods analysis

Job evaluation

Quality control

Mathematics (1952)

11 filmstrips, black and white, \$5.00 per set

Set 1

Thinking in symbols—27 frames

Grouping symbols and order of operations—34 frames

Geometric figures—29 frames

Measurement—36 frames

Variables and coordinates—33 frames

Mathematics in daily living—28 frames

Set 2

Mathematics in Aviation: the compass—32 frames

Mathematics in Aviation: Wind drift—36 frames

Indirect measurement—38 frames

Systems of equations—30 frames

Slide rule—51 frames

City College, New York

Collection of Data (1953)

Consists of 42 frames, with sound

Explains a statistical population, enumeration, sample, wrong and right questions for a questionnaire, statistical questions, schedule, six steps in field work, the census survey, primary data, editing, hand and semi-mechanical methods of sorting, machine tabulation.

STATISTICIAN

Statistician with theory and experience in sampling and experimental design required. Ph.D. preferred; M.A. will be considered. Position is in Marketing Research Department. Experience in this field, although desirable, is not necessary. The work calls for imagination and creative ability in applying statistical theory. The Department has an unusually high standard of statistical operation which is at once a challenge and opportunity to the right man. Apply R. S. Perry, Vice President of Marketing Research, Gillette Safety Razor Company, Boston, Mass.

AN ANSWER SHEET FOR TEACHING TESTS OF HYPOTHESES

R. Clay Sprowls

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Many students leave the study of statistics in an elementary course with the feeling that statistical methods are diverse in nature and plentiful in number, but that each method is unrelated to what has gone before or is to follow. The separated chapters in textbooks imply distinct materials and methods—a distinction that is both artificial and misleading. Thus, the students studies how to test hypotheses about means, percentages, and variances; differences between means, percentages, and observed and expected frequencies; and the whole gamut of common statistical tests as different methods. He may learn sooner or later that in each of these tests quite a good deal depends upon a value of alpha, or a critical ratio, or the level of significance, depending upon the terminology used in a particular course. Very often he learns only that the magic number is two and that the result of his arithmetic on the sample is statistically significant if it is greater than two in absolute value and not significant if it is less than two in absolute value.

The same basic ideas are used throughout these different tests. One must ask the same kinds of questions in approaching each of them. Only the calculations to handle the different probability or sampling distributions differ from one method to another. In order to show a central unifying theme or thread to all topics in statistics, the author has developed an answer sheet which organizes the teaching of inference around a central fourfold theme:

1. Statistics is the science of making decisions based upon incomplete knowledge (or samples).
2. Implicit in making a decision is the acceptance of one of two alternative hypotheses.
3. Associated with the acceptance of either hypothesis is the risk that one selected is wrong.
4. The function of statistics is to aid in the formulation of the alternative hypotheses and the evaluation of the associated risks of being wrong.

The answer sheet to follow will both emphasize the common elements to all of the methods and with very minor modifications, apply to a wide variety of problems.

Answer Sheet Format

- a. Basic hypothesis
- b. Alternative hypothesis
- c. Action if the basic hypothesis is accepted
- d. Action if the alternative hypothesis is accepted
- e. Error of the first kind
- f. Error of the second kind
- g. Cost or consequence of Error I
- h. Cost or consequence of Error II
- i. Random variable
- j. Sample size
- k. Alpha or level of significance

- l. Calculation of regions of acceptance and rejection of the basic hypothesis
- m. Decision rule
- n. Observed sample value of the random variable
- o. The decision and action to be taken

As the student uses this answer sheet in his study of different statistical tests, he merely changes the answers to some of the parts. For example, if the test concerns a population percentage, he writes in the relevant parameter values opposite the hypotheses in parts (a) and (b), the random variable (i) is the sample percentage or number of occurrences, and the decision rule in part (m) is obtained from tabled binomial probabilities or the normal approximation to the binomial, at the instructor's discretion. Now, when he studies tests about population means, he changes his hypotheses to state clearly values of the population mean, his random variable is now the sample mean, and his calculations will involve either the normal or t-distribution, as the case may be.

This answer sheet can be extended to include the calculation of the operating characteristic curve (or power function) at the end, as well as the proper sample size as an insertion prior to part (j). Estimation problems can also be added at the end for those cases in which the basic hypothesis is rejected and it seems natural to ask what values the parameter may take.

It is fairly obvious what changes must be made for the tests involving correlations, regression coefficients, differences between sample statistics, etc. The point is that the questions to be asked and the method of framing the solution in each case are the same. Only a change in the variable and the method of probability calculation changes. The student begins to see that there is a continuity to the study of statistics even though the different techniques are covered in different chapters of the text.

The answer sheet also takes the emphasis away from formulas and calculations and puts it on the thought process behind the tests. Thus, each time the student works a problem, he must do more than find out if the sample result is statistically significant. He must formulate the hypotheses, the actions to be taken as a result of accepting these hypotheses, the errors which may result, and their costs and consequences. Instead of viewing statistics as a collection of arithmetic calculations, he begins to learn that statistics is a method of decision making and a way of looking at things which can even be used in other problems which are not statistical, that is, do not involve probability distributions.

Finally, this answer sheet simplifies the reading and grading of both homework and examinations for the harassed teacher with large sections of the basic course because it forces all students to follow the same format.

A CLASSIFICATION OF SAMPLING PROBLEMS

J. Parker Bursk

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The following discussion is an amplification of remarks by the author acting as a discussant on the program on Training and Teaching Aids in Statistics at the December, 1958 ASA meetings. Dr. Clay Sprowls had presented a questionnaire form required of his students in connection with solutions to problems on sampling and decision making. This form appears elsewhere in the current issue of *The American Statistician*. Although the author has never used this form, he has stressed the same concepts, so that he feels that he can endorse it wholeheartedly. Since the program dealt with training in statistics, it seemed worthwhile to suggest an organizational device used successfully over a period of years in the introductory course in statistics in the Wharton School, University of Pennsylvania. It is compatible with Dr. Sprowls' form and might prove a useful adjunct to it.

By way of introduction, let me mention that the basic course in statistics is required of all sophomores in the Wharton School. They come to us with no mathematical background beyond that required for admission to the University. This creates for us all of the difficulties so familiar to teachers of statistics who must cope with similar problems elsewhere. In addition to the pure mechanics of statistical techniques, we must teach the fundamental logic and philosophy of statistics and concurrently feed in a moderate amount of mathematics pitched at a level appropriate to the students' backgrounds. At no point does the student find greater difficulty than in his introduction to sampling. He must "unlearn" and rid himself of many widely held and popular misconceptions of probability and the "law of average," and establish his statistical thinking on a sound basis. In this process, the organizational device to be discussed has proven helpful.

In the student's first contact with the theory of sampling, the discussion is restricted almost completely to the analysis of large samples. This has the advantage that temporarily he has to contend with only one sampling distribution, the Normal Curve of Error. He is fully warned, however, that this simplification does not persist into the analysis of small samples. His attention is called to the Central Limit Theorem that makes this simplification possible.

Otherwise, our introduction to sampling follows conventional lines. Methods of sampling are described and discussed, with major emphasis on simple random sampling. The student is taught the rudiments of probability. The concept of a sampling distribution is developed together with the fundamental principle that the standard error of a statistic is simply the standard deviation of the sampling distribution of that statistic. Type I and Type

II errors are treated at some length. It is pointed out that the problems of sampling are basically concerned with the testing of hypotheses and the making of estimates. At this stage of the development, the student should be ready to tackle simple problems on his own, but, already reeling under the impact of a host of new concepts, he now encounters an apparently chaotic welter of formulas and is at a loss to choose among them. If he is lucky enough to select the correct one, he is puzzled as to the interpretation of his results. The author knows of no currently popular text that helps to organize his thinking. Some additional guidance is needed.

No originality is claimed for the basic concepts underlying the organizational device to be discussed. In his "Introduction to the Theory of Statistics," Yule, in considering the sampling of attributes, classifies the problems of sampling into three situations that he designates as Case I, Case II, and Case III. The author has found it convenient to adopt and adapt Yule's Cases I and III and extend them to the sampling of variables. He has also added a Case II dealing with the setting of confidence limits. Cases I and III involve the testing of hypotheses, while Case II is concerned with interval estimates.

CASE I

Case I is identified as a situation in which the difference between a statistic and a parameter is evaluated. With an exception to be noted later, it means working with the *true* standard error rather than an estimated value. The calculation of *true* standard errors requires that certain parameters of the universe be known or assumed. Since the interpretation of results differs depending on whether the parameters are known or assumed, it is helpful to label these two situations as Case I (a) and Case I (b). In the sampling of variables, there is a further modification of each that will be termed Case I (a) (1) and Case I (b) (1). Following is an outline of the manner in which the discussion is presented to the student.

Data Given. Case I (a). The essential parameters of the universe are known. For attributes, this means only the value of p . For variables, the variance of the population must be known in addition to the parameter to be compared with the statistic.

Case I (b). The essential parameters of the universe are assumed or specified on some logical basis. Otherwise, the situation is precisely parallel to Case I (a).

Cases I (a) (1) and I (b) (1) arise in connection with variables and differ from Cases I (a) and I (b) only to

the extent that while the parameter to be compared with the statistic is known or assumed, the population variance is estimated from the sample. The student's attention is called to the t distribution for which the normal curve is an excellent approximation for large samples.

In all four of these situations there is, of course, a sample of size n from which the relevant statistics are computed.

Hypothesis Tested. The statistic came from a universe with the known or specified parameter. It is stressed, however, that the test is essentially to determine whether the observed difference is greater than we are willing to accept as the result of chance forces in random sampling.

Level of Significance. This is defined as a probability, more or less arbitrarily selected, that specifies the risk of making Type I errors.

The Sampling Distribution. Since only large samples are considered, the normal curve is the only one discussed in detail. Others, important for small samples, particularly the t -distribution, are mentioned and the student is again reminded of the Central Limit Theorem.

The Formulas. For Cases I (a) and I (b), these are true standard error formulas associated with the statistics in question. For Cases I (a) (1) and I (b) (1), the formulas are for estimated standard errors since the population variance must be estimated from the sample.

Mechanics of the Test. For large samples, the test takes the following form:

$$\frac{x}{\sigma} = \frac{\text{Statistic} - \text{Parameter}}{\text{Standard Error of Statistic}} \quad \text{or,}$$

$$t = \frac{\text{Statistic} - \text{Parameter}}{\text{Estimated Std. Error of Statistic}}$$

The probability significance of this result is, of course, determined from the tabulated values of the normal probability integral.

Interpretation. In Cases I (a) and I (a) (1), if the test leads to the conclusion that the difference is significant, only two interpretations are possible. Since the sample is known to have been drawn from the universe in question, either the method of sampling was not random, or an improbable occurrence has been observed. As the risk of the latter contingency is provided for by the level of significance, the method of sampling must be discredited.

In Cases I (b) and I (b) (1), a significant difference poses three alternatives — the sampling was not random, an improbable occurrence has been observed, or the sample did not come from the hypothesized universe. The improbability of occurrence is provided for by the level of significance, but it can never be known with certainty which of the other alternatives is true. It is customary, therefore, to assume (ideally on the basis of positive external evidence) that the sample was taken at random and hence that it did not come from a universe with the hypothesized parameters.

CASE II

Case II is the situation in which a single sample has been taken at random and it is desired to estimate parameters of the universe within a range of error attributable to chance forces in sampling.

Data Given: A single random sample of size n has been taken from which various statistics have been calculated.

Problem. The problem is to establish a range of values (confidence limits) around an observed statistic that may be expected to include the corresponding parameter with a prescribed probability.

Sampling Distribution. For large samples, it is the normal curve of error.

Level of Confidence. This is a probability, more or less arbitrarily chosen, indicating the relative frequency with which the method may be expected to produce a range that includes the parameter.

Formulas. These are the estimated standard errors of the statistics in question.

Solution. For large samples, the solution assumes the following pattern:

$\text{Statistic} \pm t \times \text{estimated standard error of the statistic}$
The value of t , of course, is that associated with the chosen confidence level.

Interpretation. Although the proper course of action appears to proceed on the assumption that there is say a 95% probability that the computed range includes the parameter, this interpretation is not strictly correct. The probability statement evaluates the *method* of making estimates and is actually independent of the numerical results of any specific sample.

CASE III

Data Given. Two samples of sizes n_1 and n_2 have been taken at random, and the relevant statistics have been calculated. It is desired to know whether the difference between like statistics in the two samples is significant.

Hypothesis Tested. This may be stated either in the form that (1) the two samples came from the same universe or (2) from different universes in which the parameters corresponding to the statistics were the same. It is again stressed that the test is essentially to determine whether the observed difference is larger than we are willing to concede to chance forces in random sampling.

Level of Significance. As in Case I, it is a probability, more or less arbitrarily chosen, that specifies the risk of Type I errors.

The Sampling Distribution. For large samples, it is the normal curve of error. In Case III, it is a mathematical model of the frequency distribution of differences between like statistics in all possible pairs of samples of sizes n_1 and n_2 drawn at random from the same universe. It has, of course, a mean of zero.

Formulas. The basic formula is that for the standard error of a difference:

$$\text{est. } \sigma_{1-2} = \sqrt{\text{est. } \sigma_1^2 + \text{est. } \sigma_2^2}$$

where est. σ_{1-2} is the estimated standard error of a difference; est. σ_1 is the estimated standard error of the statistic in the first sample, and est. σ_2 is the estimated standard error of the statistic in the second sample. By substituting the appropriate standard errors of the various statistics in the basic formula, differences between any pair of like statistics may be evaluated.

Mechanics of the Test. The actual test assumes the following form:

$$t = \frac{(\text{statistic})_1 - (\text{statistic})_2 - 0}{\text{est. } \sigma_{1-2}}$$

Since the zero does not change the value of the nu-

merator, it may be omitted. Its inclusion, however, emphasizes for the student more definitely the nature of the sampling distribution. The probability significance of t is determined from the tabulated values of the probability integral.

Interpretation. A non-significant difference should not be interpreted to mean that the test has proven that the samples were drawn from the same universe, but rather that the available evidence is insufficient to justify the rejection of that assumption. A significant difference would, of course, lead to the rejection of the hypothesis.

The foregoing is a bare skeleton of the material that is presented. It may be expanded to any degree desired by the individual teacher. Our experience shows that it helps the student to organize his thinking. When small samples are considered in subsequent discussions, it is quite easy to fit the new material into the same framework with appropriate modifications.

THE PRESIDENT'S COLUMN—CONTINUED FROM PAGE ONE

man who is a member of both. Walter Hoadley and Eugene Fisher (President of ASQC) appointed Paul Olmstead, a fellow of ASA and ASQC, to be chairman. The members representing ASA are Irving W. Burr, Past Chairman of SPES, Almarin Phillips, Chairman of our Publications Policy Committee and Donald C. Riley, Executive Director of ASA. ASQC is represented by J. Y. McClure, Maynard S. Renner and Harry L. Wehrly. The Committee has invited W. Allen Wallis, editor of the JOURNAL of ASA and Mason Westcott, editor of *Industrial Quality Control* to be non-voting members. The Office Managers of ASQC and ASA, W. P. Youngclaus, Jr. and E. M. Bisgyer, respectively, are consultants to the committee.

The Management Committee held its first formal meeting in Chicago during the Annual Meeting of ASA last December. A number of steps were taken toward the actual launching of *Technometrics* including the appointment of Don Riley as Treasurer of the new publication.

Technometrics will require the support of the entire membership and most particularly those working in the area of the physical and engineering sciences. This support has two main facets:

(1) good papers, written to inform, to demonstrate through examples and to interest the sometime user of statistical methods as well as the professional statistician; (2) financial support through subscriptions. It is hoped that this new publication will become self-supporting before too long. Beginning next year, members will be able to subscribe (at the reduced rate) when paying their dues. Meanwhile, members may subscribe by sending \$6.00 to the ASA office, 1757 K St., N.W., Washington 6, D.C.

The support of *Technometrics* is part of the continuing effort of ASA to provide an expanding publications program geared to the interests of its members. The JOURNAL of THE AMERICAN STATISTICAL ASSOCIATION and THE AMERICAN STATISTICIAN are intended to cover, as widely as possible, the best in the theory and methodological application of statistics, plus the news of interest in the statistical world both here and abroad.

In addition the Association publishes the Proceedings of the Business and Economic Statistics Section containing the papers given by the Section at the Annual Meeting.

This year a similar Proceedings for the Social Statistics Section will also be printed. These general and specialized publications, plus the occasional monographs issued by ASA ("Acceptance Sampling"; "Statistical Problems of the Kinsey Report") provide an increasing source of works of interest and value to our membership.

Another very important publication in preparation is the Cumulative Index to the JOURNAL covering volumes 35-50 (1940-1955). This index will be annotated, cross-referenced and cross-classified in such a way that it can be used to locate quickly any work contained in the JOURNAL on a specific topic for this period. There will be a complete listing of articles arranged alphabetically by author's name and giving title and location. Book reviews will also be listed. The finished volume is expected to be ready before mid-year. The work is being done with the aid of grants from the Ford Foundation and the National Science Foundation.

Careful planning coupled with conservative budgetary practice will insure the continued growth of the Association's programs for the many types of statistical specialists.

Job Opening

A New York State civil service examination for the position of Senior Statistician in the State Education Department will be held June 20, 1959.

A Senior Statistician with the Education Department is responsible for the preparation of statistical reports, analyses, manuals and handbooks. He also supervises the work of a staff of technical and clerical assistants and aids in their training. The starting salary is \$5,840 a year, with annual increases to \$7,130.

Candidates must be college graduates with 15 credit hours in mathematics or statistics, of which six hours should be in statistics. They must also have either three years' experience in professional statistical work or have completed all the requirements for a Ph.D., with at least 20 graduate semester hours in mathematics or statistics. Candidates must be U. S. citizens, but residence in New York State is not a requirement.

Applications for the examination and additional information may be obtained from the Recruitment Unit, State Department of Civil Service, the State Campus, Albany, New York.

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QUESTIONS AND ANSWERS

Edited by ERNEST RUBIN
U. S. Department of Commerce
and American University

Statistics and Adam Smith

Although it may be unorthodox, it occasionally becomes necessary to seek historical statistical data in out-of-the-way places. Social and economic statistics are imbedded in various literary works of the past. I have in mind such varied sources as the Bible, the plays of Shakespeare, the histories of Tacitus and Suetonius, the encyclopedias of the 18th century, and the treatises of classical economists.

The peculiarity of the origin of statistical data does not imply that our concern with the quality of this information is trivial. To the extent possible we should adhere to the usual safeguards applicable to statistical data. We should be sufficiently flexible, however, to accept data which accord with independent verifiable evidence apart from a knowledge of the actual manner in which they were collected, edited and tabulated. This heresy is advanced as a counter to the proposition that requires standards of unusual purity for quantitative information and implies that statistics failing to meet these standards are useless.

The general question that I am suggesting for examination is the use, treatment and interpretation of statistics that are available in non-statistical sources. I would appreciate receiving reader reaction to this idea and any pertinent references that treat this subject before undertaking further investigation on this theme.

I thought it might be of interest to examine a particular historical work in economics with special attention to the statistics therein. The statistical content of classical economics has intrigued me for a long time. Perhaps the reason for this fascination is that these works contain generalizations of micro- and macro-economics based on very slender statistical foundations. By way of contrast there is the considerable contemporary concern with data problems because it is recognized that inadequate data frustrate statistical projections and render useless some very powerful mathematical schemata.

The work I propose to examine is the *Wealth of Nations* written by Adam Smith in 1776.¹ The discussion will include, in addition to some of the statistics cited by Smith, a few references to the statistical concepts he employed. The observant reader will notice the inversion, that is, we seek statistics in the work of an economist.

Let us begin with statistics that deal with people, that

is demographic statistics. (The reader is reminded that the term "statistics" was not in use when Smith wrote; he used the expression "political arithmetic.") Regarding mortality (in the lower age groups) Smith says "... one-half the children born, it is computed, die before the age of manhood."² Smith's observations on population growth are of interest:

"... In Great Britain, and most other European countries, they (the number of inhabitants) are not supposed to double in less than five hundred years. In the British colonies in North America, it has been found that they double in twenty or five-and-twenty years. Nor in the present times is this increase principally owing to the continual importation of new inhabitants, but to the great multiplication of the species . . ."³

The relation of poverty and wealth to human fertility did not escape Smith's notice.

"... It (poverty) seems even to be favorable to generation. A half-starved Highland woman frequently bears more than twenty children, while a pampered fine lady is often incapable of bearing any, and is generally exhausted by two or three. Barrenness, so frequent among women of fashion, is very rare among those of inferior station . . ."⁴

And Smith was also aware that poverty and high mortality are closely associated:

"... It is not uncommon . . . for a (Highland) mother who has borne twenty children not to have two alive. . . . Very few of them (children) . . . arrive at the age of thirteen or fourteen. In some places one-half the children born die before they are four years of age; in many places before they are seven; and in almost all places before they are nine or ten. This great mortality, however, will, everywhere be found chiefly among the children of the common people. . . . Though their marriages are generally more fruitful than those of people of fashion, a smaller proportion of their children arrive at maturity. . . ."⁵

The last two statements of this quotation suggest that Smith was fairly close to the idea of correlation (developed about a century after Smith by Francis Galton). With regard to correlation, consider Smith's remark on a different topic:

"The money price of labour . . . does not fluctuate from year to year with the money price of corn, but seems to be everywhere accommodated, not to the temporary or occasional, but to the average or ordinary price of that necessary of life."⁶

Turning to economic statistics we find in Smith many references to prices, interest rates, taxes, wages, banking, foreign trade and other matters. The table in the *Wealth of Nations* regarding the price of wheat for the years

¹ Adam Smith, *An Inquiry Into the Nature and Causes of the Wealth of Nations*, (London, George Routledge and Sons, Ltd., 1893), pp. 780 and XVI. This edition contains a prefatory essay by Dugald Stuart.

² Ibid., p. 52.

³ Ibid., p. 54.

⁴ Ibid., p. 61.

⁵ Ibid.

⁶ Ibid., p. 27.

1202-1764 (not for each year) is certainly a remarkable statistical compilation.⁷ The title of the table is "Tabular Statements as to Average Prices of Wheat" and the table has the following captions for the period 1202-1601:

	Price of the Quarter of Wheat	Average of the different Prices of the same year	The average price of each year in money of the Present times
Years	Each year		

The use of the "average" or arithmetic mean is to be noted throughout much of Smith's writing. The last column, of expressing the average price in "constant" terms is also of considerable interest. A related table,⁸ covering the price of wheat for the period, 1595-1764, carries the explanation: "Prices of the quarter of nine bushels of the best or highest priced wheat at Windsor market, on Lady Day and Michaelmas, from 1595-1764, both inclusive; the Price of each year being the Medium between the highest Prices of those two Market days."⁹

Smith's comments on the table and his interpretation of the data are illuminating:

"... The reader will find ... all the prices of wheat which have been collected by (Bishop) Fleetwood from 1202 to 1597, both inclusive, reduced to the money of the present times, and digested according to the order of time, into seven divisions of twelve years each. At the end of each division, too, he will find the average price of the twelve years of which it consists. In that long period of time, Fleetwood has been able to collect the prices of no more than eighty years, so that four years are wanting to make out the last twelve years. I have added, therefore, from the accounts of Eton College, the prices of 1598, 1599, 1600, and 1601. It is the only addition which I have made. The reader will see, that from the beginning of the thirteenth, till after the middle of the sixteenth century, the average price of each twelve years grows gradually lower and lower; and that towards the end of the sixteenth century it begins to rise again. ..."¹⁰

An interest in secular or long-term trends of several centuries and in historical documentation, reaching occasionally to the ancient world, are not unusual in the *Wealth of Nations*. Smith was also sensitive to economic changes of comparatively short duration, such as rapid price rises in agricultural commodities occurring from scarcities following "bad seasons."¹¹

Certain economic-statistical concepts have become prominent in the twentieth century, such as gross national product and national income. Smith's formulation is in essence quite close to current thought on these subjects. Compare the following statement by Smith with the contemporary idea of GNP:

"... The whole annual produce of the land and labour of every country, or what comes to the same thing, the whole

price of that annual produce, naturally divides itself into three parts—the rent of land, the wage of labour, and the profits of stock. ..."¹²

And somewhat further the refinement we call national income is delineated by Smith thus:

"... The gross revenue of all the inhabitants of a great country, comprehends the whole annual produce of their land and labour; the net revenue, what remains free to them after deducting the expense of maintaining, first, their fixed, and secondly, their circulating capital. ... The whole expense of maintaining the fixed capital, must evidently be excluded from the net revenue of the society. ..."¹³

Today we are familiar with contractual arrangements between unions and corporations that provide for wage adjustments in accordance with specified plus or minus changes in certain price indexes. A similar adjustment principle was explained by Smith in referring to "The Assize of Bread and Ale" of 1262:

"... It regulates the price of bread according as the prices of wheat may happen to be. ... But statutes of this kind are generally presumed to provide with equal care for all deviations from the middle price, for those below it as well as for those above it. ..."¹⁴

Smith was a serious, conscientious, and honest scholar; his remarks regarding accuracy, authenticity, or availability of data are worth noting. He plainly admits, when comparing prices of different goods: "I have not been able to find any such authentic records concerning the price of raw hides in ancient times"¹⁵. And in citing some very large figures he says, "The annuities themselves are computed to amount to thirty millions (French livres) a year. ... These estimations, I know very well, are not exact, but having been presented by so very respectable a body, as approximations to the truth. ..."¹⁶ In prefacing two tables, on herring catch and on imports of salt, Smith indicates that "... The reader, I believe, may depend upon the accuracy of both accounts."¹⁷ When discussing the production of cloth from Spanish or English wool, he comments that "Quality, however, is so very disputable a matter, that I look upon all information of this kind as somewhat uncertain."¹⁸

The purpose of this brief discussion has been to draw attention to Adam Smith as a statistician. I have also suggested that his work is a valuable repository of historical quantitative data. Many works of the past, including those of economists, deserve careful study and exploitation from the statistical point of view. Given the limitations of data in prestatistical eras, that is mainly prior to 1800, and the attrition of historical materials, it becomes important to extend the area of research to non-traditional sources.

⁷ Ibid., pp. 203-206.

⁸ Ibid., p. 205.

⁹ *The Oxford Universal Dictionary* (3rd revised Ed., in one Volume, 1955) identifies Lady Day and Michaelmas as occurring on March 25 and September 29 respectively. The word "medium" according to this source meant average in Smith's time.

¹⁰ Smith, p. 148.

¹¹ Ibid., p. 157.

¹² Ibid., p. 201.

¹³ Ibid., p. 215.

¹⁴ Ibid., pp. 142-143.

¹⁵ Ibid., p. 186.

¹⁶ Ibid., p. 734.

¹⁷ Ibid., p. 417.

¹⁸ Ibid., p. 197.

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NEWS ABOUT MEMBERS

William E. Andrus, Jr. has been appointed Manager of Applied Computations, on the staff of the Manager of Product Development at the Data Processing headquarters of the International Business Machines Corporation in White Plains, New York. Mr. Andrus was previously Manager of the Scientific Computation Laboratory of IBM.

William B. Cooney will be compiling information collected on collection, transmission, storing and distribution of natural gas in the United States.

Reavis Cox, Professor of Marketing at the University of Pennsylvania, has become Director of Planning for Marketing Distribution of Alderson Associates, Inc., Philadelphia. Dr. Cox will concentrate on the development of marketing programs concerning all aspects of selling and sales management.

Alice K. Cullen, formerly a Supervisory Survey Statistician in the Industry Division, Bureau of Census, has transferred to the Small Business Administration.

Lawrence Danziger is now associated with International Business Machines as a Staff Statistician in the Poughkeepsie Testing Laboratory.

Bernard J. Derwort has been appointed Associate Professor of Mathematics and Chairman of the Department at the College of St. Thomas in St. Paul, Minnesota.

Sidney P. Feldman has recently been appointed Assistant Professor of Business Administration at the University of Kansas.

Eberhard M. Fels, formerly of the Department of Economics of the University of California at Berkeley, has been Associate Professor of Mathematics at the University of Pittsburgh since October 1958.

Benjamin Z. Gil, formerly Chief of the Demographic and Social Division and in charge of Population Census Planning at the Central Bureau of Statistics, Israel, has been appointed Population Census Expert to the Government of Ghana by the Technical Assistance Administration of the United Nations. His address will be: c/o Resident Representative, United Nations Technical Assistance Board, P.O.B. 1423, Accra, Ghana.

Sidney Goldstein, formerly with the Division of Manpower and Employment Statistics, Bureau of Labor Statistics, has been appointed Chief of the Economic Impact Research Branch, Bureau of Public Roads.

Robert L. Gustafson is Associate Professor in Agricultural Economics, Michigan State University.

A. F. Holmes has transferred from the Department of National Defence, Ottawa, back to the Dominion Bureau of Statistics, Ottawa, as Statistician, Textiles and Miscellaneous Products, Industry and Merchandising Division.

Gerhard J. Isaac is Chief of the Statistics Branch of the U. S. Army Medical Research and Nutrition Laboratory in Denver, Colorado. This activity of the Office of the Army Surgeon General was established recently by the merger of the Medical Research and Development unit at Fitzsimons Army Hospital and the Army's Medical Nutrition Laboratory.

Mortimer B. Keats is now with the Knolls Atomic Power Laboratory, General Electric

Company, Schenectady, New York as a statistician with the Nuclear Core Operation.

Leslie Kish has completed a special research assignment as Visiting Research Associate in the Department of Statistics of Harvard University and has returned to his position at the University of Michigan, where he is Head of the Sampling Section of the Survey Research Center and Associate Professor of Sociology.

Stanley Lebergott, who received a Rockefeller Public Service Award, 1958-59, is spending the academic year at Harvard working on a study of employment and earnings in the United States since 1800.

Donald G. Livingston, formerly Senior Research Analyst, Operations Research Unit of the Prudential Insurance Company, Newark, New Jersey has joined the staff of the Stevens Institute of Technology, Hoboken, New Jersey as Assistant Director of the Laboratory of Psychological Studies.

Lawrence C. Lockley has resigned as Dean of the School of Commerce, University of Southern California. He will be on leave during the academic year 1959-60 and will be Visiting Professor of Marketing at the Graduate School of Business, Columbia University. He is scheduled to return to the University of Southern California in September, 1960 as Professor of Business Administration.

Stephen F. Longo has completed a six-months' Management Training Course sponsored by the Western Electric Company and has been reassigned to Manufacturing Area "B" Headquarters in Chicago, Illinois as a Department Chief in charge of Engineering Services.

William G. Madow, Stanford Research Institute, has been appointed Professor of Statistics at Stanford University, Palo Alto, California.

Paul W. McCracken resigned as a member of the President's Council of Economic Advisers as of January 31, 1959, in order to return to the University of Michigan.

Robert J. Myers, Chief Actuary of the Social Security Administration, Department of Health, Education and Welfare, has been chosen by the National Civil Service League as one of the ten top career men in the Federal Government for 1959. The League, a non-partisan organization of citizens for better government through better personnel, annually presents these awards. Mr. Myers was selected to receive one of the League's Fifth Annual Career Service Awards because of his competence, efficiency, character, and continuity of service.

Donald G. Nix is now Statistical Analyst for the Western Union Telegraph Company.

Bernard S. Pasternack received a Ph.D. degree in Experimental Statistics from North Carolina State College in January, 1959. His appointment as Assistant Professor in the Department of Biostatistics, University of North Carolina, becomes effective September 1, 1959.

Ray E. Schafer is a Senior Quality and Reliability Engineer in the Semiconductor Division, Hughes Products, Costa Mesa, California.

Marvin A. Schneiderman, Chief Statistician of the Cancer Chemotherapy National Service Center, National Cancer Institute, Department of Health, Education and Wel-

fare, has been given a Rockefeller Public Service Award in recognition of outstanding public service. During the academic year 1959-60 he will be based at the London School of Hygiene and Tropical Medicine, studying methods of conducting more efficient cooperative clinical trials, particularly in cancer, through the development of new statistical techniques.

John Shirer, formerly Director of the Project Fiscal Management Branch of the Public Housing Administration, has been appointed Director of the Economics Branch, Public Housing Administration, Housing and Home Finance Agency, Washington, D. C.

Walter E. Simonson has a new position in the Department of Speech at Mississippi Southern. He will direct research projects and teach courses in experimental methodology.

James H. Stapleton was appointed Assistant Professor in the Department of Statistics at Michigan State University beginning in September, 1958. His duties include teaching and consulting.

O. C. Stine, Assistant Chief of the Bureau of Agricultural Economics, U. S. Department of Agriculture, until his retirement, will teach during the last quarter of the current academic year at the University of Southern Illinois.

John W. Tukey, Professor of Mathematics at Princeton University and a member of the Mathematical Research Department of Bell Telephone Laboratories, has been appointed Assistant Director of Research in Communications Principles at the Laboratories. He will continue to serve at Princeton as Professor of Mathematics.

C. C. Van Vechten is Special Assistant to the Vice-President in charge of Engineering, Tapco Group, Thompson Ramo Wooldridge Corp., Cleveland, Ohio.

Carl E. Veazie is now associated with the firm of Ebasco Services, Inc., business and engineering consultants. He is a consultant in the Department of Facilities, Community, and Industrial Planning.

W. Allen Wallis, Dean of the School of Business, University of Chicago, and Editor of the *Journal of the American Statistical Association*, has been appointed Executive Director of a Cabinet committee on price stability and economic growth. The President created the special committee in January to "serve as a continuing Cabinet group to study the problem of how to maintain reasonable price stability as an essential basis for achieving a high and sustainable rate of economic growth." Vice-President Richard M. Nixon is Chairman of the committee.

Clifton R. Wharton, Jr. has been appointed the first Field Associate in Agricultural Economics for the Council of Economic and Cultural Affairs, with his headquarters in Singapore. The Council is a private non-profit organization established to further the development of research and teaching in economics, community development, and rural self-government in Asia.

Dale Yoder, former Director of the Industrial Relations Center of the University of Minnesota, has been appointed Professor of Industrial Relations in the Graduate School of Business, Stanford University.

CHAPTER NOTES

Buffalo-Niagara

Mr. Richard S. Bingham, Jr., Supervising Engineer of the Quality Control Branch of the Carborundum Corporation, Niagara Falls, New York, was the speaker of the evening of January 15, 1959. The subject of Mr. Bingham's talk was "Modern Uses of the Range". He emphasized the practical aspects of the range as a tool of statistical analysis. Once maligned because of its lack of "sophistication", the range has become the object of advanced statistical thinking. Uses of the range include: construction of confidence limits about the mean, tests of hypothesis, estimation of the standard deviation, separation of significantly different means into groups, tests for outliers, serial correlation and many others.

Mr. Bingham's discussion was particularly noteworthy because of his scholarly yet extremely practical approach which was unique in its excellent documentation.

"Simulated Air Traffic Control" was the title of the talk given to the February 12th meeting of the Buffalo-Niagara Chapter by Mr. Alfred Blumstein, research physicist of the Cornell Aeronautical Laboratory.

In the face of increased speed and numbers of current and projected aircraft, air traffic control is a problem of ever increasing importance and complexity in modern society. Mr. Blumstein emphasized the use of simulation models as an aid in making decisions in this area. The disadvantages of "real time" experiments in cost, scale and other factors make "fast time" simulation a necessity. Procedures of data collection and the synthesis of the information into valid conclusions were described. Stress was also put on testing the validity of the simulation and on selecting appropriate measures of system effectiveness.

The large number present eagerly participated in the discussion period which followed.

Central Indiana

Dr. Charles R. Hicks, Associate Professor of Mathematics and Statistics at Purdue University and President of the Central Indiana Chapter, delivered the Presidential Address at the February 12th meeting. Dr. Hicks' topic was "Incomplete Block Designs: Application and Theory". The meeting, which was held in the Union Building of the Indiana University Medical Center in Indianapolis, was preceded by dinner.

On March 12th the Chapter heard Professor Cletus Burke of Indiana University. Professor Burke's subject was "Applications of Statistics to Psychology".

Central New Jersey

The speaker at the February 23rd meeting was Irving Roshwalb, Director of Research, Gallup and Robinson. Mr. Roshwalb's subject was "Advertising Research".

Chicago

The third dinner meeting of the 1958-59 season was held on January 21st. Dr. Leonard Kent of Needham, Louis & Brorby Co., spoke on "Problems of Accessibility and Cooperation in Executing Sample Designs of Human Populations." Dr. Kent

discussed the problem of non-response and some of the means of keeping it to a minimum. He advocated using as many checks as possible in determining the degree and direction of bias arising from non-response.

A joint luncheon meeting with the Chicago Chapter of the American Marketing Association was held on January 29th. The speaker at this meeting was J. T. Miller, Director of Research of the Meredith Publishing Co. Mr. Miller's subject was "Scope, Methods and Techniques for Acquiring and Processing Research Data".

At the February 12th luncheon meeting Louis Levine, Assistant Director of the Bureau of Employment Security, U. S. Department of Labor, spoke on "Labor Force Trends in the Current Economic Scene". Mr. Levine discussed trends in unemployment during the recovery from the recession, and also noted the decline in the number of direct production workers and the increase in non-production workers in manufacturing in recent years. He also described some of the factors which have contributed to reduced labor turnover during the past decade.

"Collective Bargaining—A Science or a Test of Economic Strength?" was the subject of the February 26th luncheon meeting. Mr. Lee Shaw, a partner in the firm of Seyfarth, Shaw, Fairweather and Geraldson, was the speaker. Mr. Shaw considered several aspects of collective bargaining, including the extent to which statistical information is being used and should be used in bargaining.

The fourth dinner meeting of the year was held jointly with the Chicago Chapter of the American Marketing Association on March 5th. The dinner meeting was preceded by a late afternoon session at which Harry W. Hull, R. R. Donnelley & Sons Co., discussed "Designed Experiments without Balance". The speakers of the evening were Tom Caywood of Caywood-Schiller Associates and Byron Marshall of Arthur Andersen & Company. Their subject was "Operations Research—How Can It Help Marketing?".

Columbus

The Columbus Chapter of the American Statistical Association has held four meetings during the current 1958-1959 year. The speakers and topics discussed have been as follows:

Professor Paul Fertig, Department of Accounting, The Ohio State University, spoke in October 1958, on "Statistical Applications in Accounting".

Mr. William Papier, Director of Research and Statistics, Ohio Bureau of Unemployment Compensation, spoke in November 1958, on "Employment and Unemployment in Ohio".

Mr. Howard G. Brunsmann, Chief, Population Division, Bureau of the Census, spoke in January 1959, on "Plans for the 1960 Census of Population".

Professor Ransom Whitney, Department of Mathematics, The Ohio State University, spoke in February 1959, on "Game Theory."

Detroit

"Predictive Research—An American Frontier" was the topic of the dinner meeting held on January 21st. Mr. Victor Haw-

kins, marketing account executive with the Campbell-Ewald Co., was the speaker.

The speakers at the February 25th meeting were Dr. Wilbur R. Thompson and Dr. John M. Matilla, both professors at Wayne State University. Their subject was "An Econometric Model of Postwar State Industrial Development".

Hawaii

Officers for the calendar year 1959 are as follows:

President—GORDON FRAZIER, Bank of Hawaii.

1st Vice-President—PAUL T. TAJIMA, Office of Territorial Tax Commissioner.

2nd Vice-President—PAUL PEPERZAK, Hawaiian Pineapple Co.

Secretary-Treasurer—GEORGE H. TOKUYAMA, Bureau of Health Statistics, Hawaii Department of Health.

University of Illinois

At the January 7th meeting T. A. Yancey was elected Secretary of the Chapter to fill the unexpired term of Frederick Williams, who left to take a position at the University of Missouri.

Milwaukee

On February 11th the Chapter heard Professor Philip M. Hauser, Chairman of the Department of Sociology at the University of Chicago and former Deputy Director, U. S. Bureau of the Census. Dr. Hauser's subject was "Growth of Metropolitan Areas".

Montreal

The third regular meeting of the Chapter was held on December the 10th. Mr. Jacques Barrière, Assistant-Director, Traffic Department, City of Montreal, presented some very interesting points concerning "Field and Office Procedures of Traffic Work in Montreal". On January the 13th, Dr. A. B. Blankenship of Blankenship-Gruneau Research entertained the membership with a very interesting talk on Motivation Research. The lively discussion period that followed showed how well the talk was received.

On January the 28th the Discussion Group met to hear Dr. Gilbert Paul, McGill University, and Dr. Alexis Zinger, University of Montreal, present "Some Further Thoughts on Non-Parametric Methods". It was decided to devote the coming meetings to this important domain of statistics.

Nebraska

The February 23rd meeting of the Nebraska Chapter was held in the Faculty Lounge of Creighton University in Omaha. Mr. Jack Bennett of the National Cash Register Company described the NCR 304 transistorized data-processing equipment and its applications to a variety of business and industrial problems. Samples of computer components were available for inspection by members of the Nebraska Chapter.

New York

The subject of the January 14th meeting of the Biostatistics Division of the Chapter was "Clinical Trials". Dr. Donald

Mainland, Chairman of the Department of Medical Statistics, New York University, discussed the design of clinical trials; Dr. Jonathan T. Lanman, Associate Professor of Pediatrics, New York University, described the performance of a clinical trial (Retrolental Fibroplasia and Oxygen Therapy); and Elizabeth Street, Department of Medical Statistics, New York University, talked about the analysis of data from a clinical trial (Cancer Chemotherapy).

The Physical and Engineering Division experimented with an informal conference type of meeting on January 29th. Persons attending gave brief descriptions of their duties and the major problems associated with their work. Management, employment, work load and pay scales associated with statistical positions were discussed. It was generally agreed that the meeting was interesting and of benefit to those participating.

On February 4th the Social Statistics Division held a meeting on "Social Statistical Research in Universities, and Its Relation to Graduate Training". The speakers were David L. Sills, Columbia University, and Edgar Borgatta, New York University. Mr. Henry W. Riecken, Jr., National Science Foundation, Washington, D. C. was chairman.

Pittsburgh

The October meeting was addressed by Dr. John Wilkinson of Westinghouse Electric Corporation who spoke on "Experimental Procedures using Pair-wise Comparisons". In November, Dr. Harry Smith, Procter and Gamble, discussed "Some Uses of Chi-Square in Market Research with Extension to Multi-Dimensional Tables". The December meeting, a joint dinner session with the Pittsburgh Chapter of A.S.Q.C., was addressed by Dr. Alfred M. Schneider of American Cyanamid on "Some Aspects of Multivariate Analysis". This meeting was attended by Mr. Walter E. Hoadley, Jr., President, and Mr. Donald C. Riley, Secretary-Treasurer, of the American Statistical Association. In January, Dr. Donovan J. Thompson, Graduate School of Public Health, University of Pittsburgh, presented "Some Views on Current Sampling Practices in Surveys and Their Bases".

Rochester

The Rochester Chapter's field of interest breakdown is about evenly divided between Business and Economics and Physical Sciences. As such, the subject matter of meetings usually lies in either of these areas. At the January 14, 1959 meeting the subject represented a different area but was interesting to both the economists and physical scientists. Dr. Russell Green of the University of Rochester Psychology Department addressed the Chapter on "Statistical Applications in Psychological Research."

Dr. Green began his talk by stating that the importance of statistics in psychological research has grown to the point where editors of many psychology journals will not accept studies for publication which are not statistical analyses. This emphasis on the use of statistics has led psychologists to use statistical methods widely and as a

result they have encountered some unique problems. Dr. Green illustrated several statistical problems of design, sampling and variance analysis experienced in analyzing social psychological data. Examples were given using data collected in a study of the reaction of humans with different anxiety levels to various drugs, a study of differences between true and psychological norms observed in human efforts to find "best performance" mid-points in machine settings, and a study of electrical activity in different areas of the brains of animals.

As at other meetings this year where informality has been stressed, refreshments were served after the speaker's address.

At the meeting of the Rochester Chapter Tuesday evening, February 3rd, Mr. Robert H. Morris, Head of the Scientific Computing Department, Kodak Park Works, Eastman Kodak Company, discussed applications of digital computers to statistics. In his talk Mr. Morris described the various types of computers with particular emphasis on their programming characteristics, and illustrated his comments by developing a program for the IBM 705 machine to determine the coefficients of a quadratic equation. He pointed out that the solution of statistical problems on a computer involved formulation of the problem and numerical analysis as preliminary to programming. In addition, he mentioned typical statistical problems which a computer can solve together with estimates of the time and cost of programming and computing solutions.

Saint Louis

The subject of the February 19th meeting—a noon meeting at Hulling's Restaurant—was "Productivity Changes and Business Cycles". The speaker was Murray Wernick, Senior Economist, Board of Governors of the Federal Reserve System. Mr. Wernick presented productivity data for each of the phases of the business cycle, and discussed some of the reasons for variations in the rate of growth in productivity during these phases.

The March 19th luncheon meeting heard Guy Freutel, First Vice-President of the Federal Reserve Bank of St. Louis, speak on "Wage Surveys and Salary Administration—A Case Study". Mr. Freutel discussed sampling and other aspects of a community wage survey and then traced the steps involved in translating data from the survey into decisions about adjustment of rates for a particular company.

Speakers and their subjects for the remainder of the 1958-59 season are as follows:

April 16—Wilbur Smith and Associates: "Statistical Methods Used in the St. Louis Metropolitan Transportation Survey"

May 21—James Pohrer, Industrial Representative, St. Louis Chamber of Commerce: "Implications of the Addition of Jefferson County into the Standard Metropolitan Area."

June 18—Virgil Borders, Regional Director, National Conference of Christians and Jews, and Dr. Clement Mihanovich, Chairman, Department of

Sociology, St. Louis University: "Characteristics of the People Who Are Moving Into St. Louis"

San Francisco

The following new officers were elected at the January 14th meeting:

President—CHARLES A. ROUMASSET, Bureau of Labor Statistics, U. S. Department of Labor

Vice-President—ROY C. CAVE, San Francisco State College

Secretary—ERNEST C. OLSON, Economics Department, Bank of America

Treasurer—RICHARD E. TOWEY, Federal Reserve Bank of San Francisco

An outstanding speaker and a timely topic of general interest combined to make the Chapter's second meeting of the year, held on February 12th, one of the best-attended and most successful in a long time. Professor R. G. D. Allen of the London School of Economics, currently Visiting Research Professor of Economics at the University of California, spoke on the subject, "Problems of Inflation." Professor Allen's discussion centered on longer-run aspects of inflation, with special reference to cost-price relationships in the United Kingdom. These relationships show little evidence of consistent patterns of wage-price spirals, and suggest that with certain exceptions the principal influence affecting wage rates is the demand for labor, rather than changes in the general level of prices.

Southern California

On January 29th the Chapter heard Walter E. Hoadley, Jr., Treasurer of the Armstrong Cork Co. and Past-President of the American Statistical Association. Dr. Hoadley's subject was "Forecasting and the Statistician". The talk was preceded by a cocktail period and dinner at the Mona Lisa Restaurant.

The subject of the February 26th dinner meeting was "Basic Mathematical Concepts in the Use of Business Statistics". Dr. E. Justin Hills of the Mathematics Department of Los Angeles City College was the speaker.

State College, Pa.

The 1959 officers of the State College Chapter are:

President—WILLIAM S. RAY, Associate Professor of Psychology, Pennsylvania State University.

Vice-President—OWEN H. SAUERLENDER, Associate Professor of Economics, Pennsylvania State University

Secretary—JUDITH STOYLE, Instructor of Business Statistics, Pennsylvania State University.

Washington

The Chapter's annual dinner meeting was held at the Occidental Restaurant on February 5th. The speaker was Philip M. Hauser, Chairman of the Department of Sociology and Director of the Population Research and Training Center, University of Chicago. Dr. Hauser's subject was "Population and Economic Growth".

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CONTRIBUTED PAPERS FOR 1959 SESSIONS

The 1959 Program Committee invites members to submit papers for the Contributed Papers sessions of the annual meeting in Washington this December.

The Contributed Papers sessions are intended especially as a forum for the presentation of independent papers on new developments in statistics. The sessions serve the purpose of broadening the scope of papers at the annual meeting to cover new work falling outside the limited number of topics arranged for by the Program Committee. It is hoped also that the sessions will encourage young members of the Association to submit papers.

Consideration will be given to all topics submitted by July 15. The papers need not be submitted in finished form by that date but it will be necessary to submit a summary indicative of the nature of the proposed paper. Some restriction on the number of papers may be required in view of time and space limitations at the annual meeting. Letters may be addressed to **Charles D. Stewart**, Chairman of the Program Committee, Deputy Assistant Secretary of Labor, U.S. Dept. of Labor, Washington 25, D.C. or to any of the following Section Program representatives:

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